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## AGROTECHNOLOGY

### USE OF FISH PROTEIN CONCENTRATE IN ANIMAL FEEDS

Riga SOVETSKAYA LATVIYA in Russian 9 Jun 83 p 2

KUSHAK, R., senior scientific staff-member, doctor of biological sciences,  
Institute of Biology, Latvian SSR Academy of Sciences

[Abstract] The production of fish protein can be significantly improved with little additional capital expenditures. The fact is that substantial quantities of protein and other biologically-valuable compounds which are in the initial product are not being used in preparing fish flour. The workers of the author's institute and the Riga Fishing Trawler Base have worked on the problem of increasing fish flour output for some time, and have suggested a method of using fish bouillon as a concentrate, containing up to 76% protein, a small quantity of fat, many minerals and other valuable nutrients, free amino acids and other biologically active compounds. This bouillon is taken from beneath the presses in the fish factory. Feeding experiments with laying hens have shown that the addition of 1% fish protein concentrate to combined feed increases egg production by 16% and egg mass by 3%. Addition of 1% of fish protein concentrate to the feed of piglets increases weight gain by 10 to 28% and decreases feed consumption per kilogram of weight-increase by up to 11%. Ordinary fish flour, though its chemical composition is similar to that of the new concentrate made from fish bouillon does not have the same high growth-stimulating effect. The Riga Trawler Base alone could have produced 387 tons of fish protein concentrate in the last year. The time has come for the transition from experimental production of this valuable product to mass production. [536-6508]

UDC: 519.281.2:541.6:547.87:615.015.11

SOME QUESTIONS, CLEAR AND UNCLEAR, CONCERNING THE SEARCH FOR INTERRELATIONSHIPS BETWEEN CHEMICAL STRUCTURE AND BIOLOGICAL ACTIVITY

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA BIOLOGICHESKAYA in Russian  
No 6, Nov-Dec 82 (manuscript received 28 May 82) pp 827-835

NIZHNIY, S. V. and KOSOLAPOV, S. S., Scientific Research Institute for Biological Testing of Chemical Compounds, Kupavna

[Abstract] Work in the area of establishing the relationship between chemical structure and biological activity falls into two nonintersecting classes: the search for statistically-significant interrelationships between hydrophobic, electronic and steric properties of molecules in compounds and biological activity, and the search for chemical determinants and their combinations in structures defining the type of activity of substances. Although a great deal of useful work has been done by mathematical studies with computers in both these areas, the problem remains generally unsolved in both breadth and depth. The basic hypothesis that there is a deterministic and unambiguous cause and effect relationship between structure and activity remains unconfirmed. The basic concept of directedness and effectiveness of biological effects used to determine relationships between structure and activity has not even been defined in strict terms. Current trends in the search for a structure-activity relationship give little attention to the problem of the influence of changing structural parameters and characteristics on changes in the direction of biological effects. The obvious difficulty of the problem of determining true structure-activity relationships is the need to compare results obtained in vivo and in vitro, while frequently the in vitro studies are "models of models." More detailed studies are needed of the methods of description and formalization of biological activity--the directionality and effectiveness of action of substances. A study was made for means for improving the equations used in such models. Methods of the theory of pattern recognition are applied to classification of substances based on the type of action which they exhibit. The kinetic approach suggested, though unsuitable for slowly-acting substances whose effects result from accumulation and formation of intermediate products, can assist in the understanding of the interrelationship between chemical structure and biological activity of many compounds. Figures 2; references 8 (Russian). [535-6508]



UDC: 617.735-001.5-092.9

STUDY OF MECHANISMS OF DELETERIOUS EFFECT OF VISIBLE LIGHT ON HEALTHY RETINA OF ANIMALS

Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR in Russian No 12, Dec 79  
(manuscript received 23 Aug 78) pp 57-60

[Article by M. A. Ostrovskiy, A. I. Bogoslovskiy, M. V. Zuyeva, A. A. Shvedova, O. I. Shcherbatova, N. L. Sakina, I. B. Fedorovich, L. D. Smirnov, V. A. Shcharpatyy, M. K. Pulatova and A. A. Kaban, Moscow Scientific Research Institute of Eye Diseases imeni Helmholtz, Institute of Chemical Physics, USSR Academy of Sciences]

[Text] The American researcher, Noell, discovered that visible light can damage the animal retina (1965). Experiments performed by Dowling and Sidman (1962) and Noell (1965) established that, in animals with various forms of retinal dystrophy, light accelerates substantially the process of visual cell degeneration, also damaging the pigment epithelium. These findings served as grounds to try to treat hereditary degeneration of the human retina (or, more precisely, to arrest the disease) with the dark (Berson and Goldstein, 1972; Berson, 1973). There are also indications of the possible damaging effect of bright light in the visible range of the spectrum on the human healthy eye (Eccles, Flynn, 1944, and others).

In 1971, Noell and Albrecht expounded the hypothesis that the mechanism of deleterious effect of visible light could be related to photodamage to rhodopsin molecules and abnormally high lipid peroxidation induced by light. It is known that there is an enormous amount of unsaturated fatty acids (UFA) in phospholipids of the photoreceptor membrane, and about half of them are referable to polyunsaturated docosahexaenoic acid ( $C_{22:6}$ ). The rate of free-radical oxidation increases substantially with increase in unsaturation, while oxygen uptake by the photoreceptor layer of the retina is greater than its uptake by other cells and tissues. Both of these factors--polyunsaturated nature of UFA of photoreceptor membrane lipids and intensive oxygen uptake by retinal tissues--obviously increase the danger of both dark and (particularly) photo-induced free-radical damage to this organ. Normally, the healthy retina contains a sufficient amount of natural antioxidants ( $\alpha$ -tocopherol, ubiquinone and others) that regulate lipid oxidation. In the presence of artificially induced nutritional E avitaminosis in rats, as the disease develops there is accumulation of lipid hydroperoxide and development of degeneration of photoreceptors (V. Ye. Kagan et al., 1977).

In 1956-1957, N. M. Emanuel' proposed the use of inhibitors of free-radical reactions as protective and therapeutic agents (radioprotective, antineoplastic, "geroprotective" [?]). The possibility of using them as photoprotectors for the eye is discussed here.

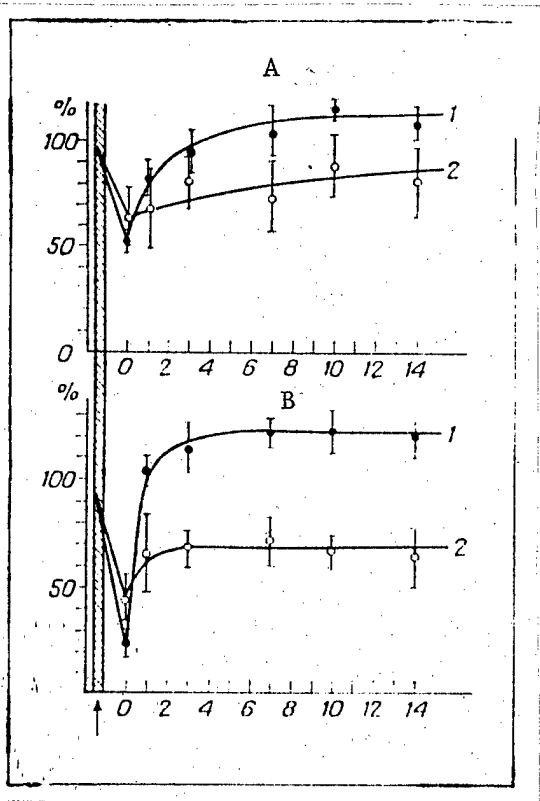


Figure 1.

Dynamics of changes in b- (A) and a-waves (B) on ERG after intensive illumination of rabbit eye after giving oxypyridine (1) and in control animals (2)

X-axis, day of experiment. Arrow shows exposure to light (500,000 lux for 3 h); y-axis, changes in wave amplitude (% of base levels taken as 100%).

In the group of rabbits given the antioxidant before exposure to light, we observed complete and rapid recovery of amplitude of a- and b-waves on the ERG within 14 days (Figure 1). Already on the 3d-4th day, the ERP reached normal values.

Thus, our findings indicate that inhibitors of free-radical reactions could be not only antineoplastic and antiradiation agents, but effective photoprotectors.

A special unit was developed by the staff of the Moscow Scientific Research Institute of Eye Diseases imeni Helmholtz and Institute of Chemical Physics (IKhF) to illuminate the rabbit eye in order to examine the nature of the damaging effect of bright light and to search for means of protection against such damage. We used this unit to induce persistent retinal damage in the animals. The photodamage was assessed on the basis of decline of electric responses of the retina over a period of several weeks--early receptor potentials (ERP), oscillatory potentials and electroretinogram (ERG) waves. Previously we studied these parameters (M. V. Zuyeva et al., 1977; Shvedova et al., 1978) with exposure of the rabbit eye to visible light with the following characteristics: illumination on the level of the cornea 100,000-250,000 lux, exposure time 0.5-1.5 h. In the same experiments, we tested the effects of the antioxidant, oxypyridine [hydropyridine?] (synthesized at the IKhF, USSR Academy of Sciences) in a dosage of 5 mg/kg, on development of signs of photodegeneration in the rabbits. In the study reported here, we used more intensive light (500,000 lux for 3 h) and increased the dose of oxypyridine to 10 mg/kg. Immediately after illumination, there was drastic decline in amplitude of recorded bioelectric potentials in the control group of animals, with subsequent slow recovery within 2-3 weeks without, however, reaching the base level.

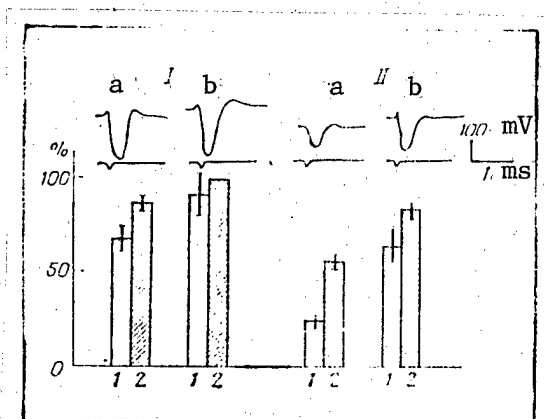


Figure 2.

Effect of dark adaptation on rhodopsin content and amplitude of electric reactions of frog retina after exposure to different intensities of light.

Top of figure: ERG waves; bottom: rhodopsin content (1) and ERP level (2), % of same parameters in intact animals taken as 100%.

- I, II) parameters after delivery of light (3000 and 100,000 lux, respectively, for 20 min)
- dark adaptation not used after exposure to light
  - dark adaptation for 1 h

when there is discoloration of about 75% rhodopsin, neither resynthesis thereof in rods, nor a- and b- waves on the ERG, which reflected under our experimental conditions rod activity, did not recover completely during 1 h dark adaptation.

In the same experiments, biochemical methods were used to examine damage to molecules of rhodopsin in the photoreceptor membrane of the visual cell as a result of prolonged and intensive illumination of the eye of an intact animal (Figure 3). The capacity of rhodopsin precursor, opsin, to synthesize rhodopsin with typical maximum of absorption spectrum at 500 nm with addition of an excess of 11-cis-retinal served as an indicator of unadulterated rhodopsin. After exposing frogs to light of relatively low intensity (3000 lux) for 20 min, about 75% of the rhodopsin is left in the retina. There was virtually no impairment of capacity of visual pigment for regeneration in vitro. However, after exposure for 20 min to strong light (100,000 lux), when only 25% undischlorinated rhodopsin remained in the retina, no more than 40% of visual pigment underwent regeneration in vitro. In other words, there was substantial decrease in opsin's capacity for regeneration with addition of excess retinal. Since the regenerative capacity of rhodopsin, or more precisely opsin's capacity for conversion to rhodopsin, is viewed as one of the main signs of its unadulterated nature, it must be conceded that, to some extent, this state is lost after the damaging effect of light, i.e., the opsin in the photoreceptor

In the next series of experiments, which were performed on frogs, we also tested the deleterious effect of light, as determined by the retina's electric responses. However, our main objective was to determine the effect of intensive illumination on the visual pigment, rhodopsin.

It was established, that after intensive illumination of the frog eye, dark adaptation for 1 h caused regeneration of visual pigment, recovery of ERP and ERG waves. However, ERP recovered sooner than ERG parameters and rhodopsin content of rods (Figure 2). Since the cones make the main contribution to magnitude of ERP in the frog retina, it can be assumed that rods containing rhodopsin are more susceptible to the deleterious effect of light than cones. The latter's photoreceptor membranes contain another visual pigment, iodopsin. As we know, the rate of rhodopsin regeneration is appreciably lower than that of iodopsin regeneration. Thus, after intensive illumination,

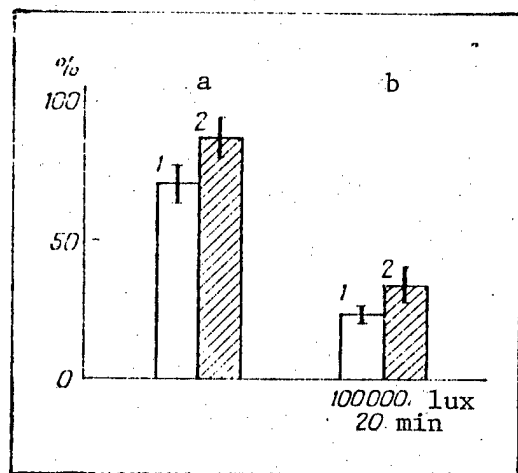


Figure 3.

Effect of light of different intensity on rhodopsin content in frog retina and its capacity for regeneration in the presence of 11-cis-retinal

- a, b) parameters after illumination (3000 and 100,000 lux, respectively, for 20 min)
- 1) rhodopsin content
  - 2) rhodopsin content in the presence of 11-cis-retinal (%)

Rhodopsin content of retina during dark adaptation was taken as 100%.

membrane is "spoiled." It is "spoiled" either as a result of direct photo-oxidation, or the effect of products of peroxidation of photoreceptor membrane lipids. The latter possibility appears to be more realistic at the present time. Indeed, the experiments of Kagan et al. (1973) and Farnsworth and Dratz (1976) revealed that, under aerobic conditions, there was accelerated build-up of products of lipid peroxidation in a retinal homogenate and suspension of external photoreceptor segments under the influence of pro-oxidants or light. It is known that such products are capable of damaging membrane proteins, and first to be affected are those with thiol groups. Oxidation of SH groups is most likely effected by free-radical products of peroxidation. Rhodopsin is virtually the only protein in the photoreceptor membrane, and all SH groups belong to it. Only two, so-called dark SH groups, can be titrated in membrane-bound rhodopsin, whereas when the

membranes are completely discolored four more SH groups are added to it (Ostrovsky, 1968).

Thus, the discolored molecule of rhodopsin ... [line or lines missing] free opsin or products of photolysis of rhodopsin) is much more sensitive to various deleterious agents than the nondiscolored rhodopsin. Among such damaging agents we can include, first of all, products of peroxidation of photoreceptor membrane lipids and the light absorbed by products of rhodopsin photolysis. For this reason, prolonged, continuous and intensive illumination of the retina, which keeps visual pigment in a discolored state, is capable of having a damaging effect on the healthy and, particularly, pathological retina. There is marked increase of danger of damage if, for some reason, there is impairment of the system of natural antioxidant protection of the visual cell.

With reference to the mechanisms of damaging effect of light on the retina, we should not overlook another of its photosensitive structure, the pigment epithelium. The latter is situated between the retina and choroidea; its processes are in close contact with photoreceptors. There are numerous black melanoprotein granules (MPG) in these processes and the body of the epithelial cell. As we know, more than 85% of the light hitting the eye traverses the

retina and is absorbed by it. Disruption of contact between photoreceptors and pigment epithelium cells is catastrophic to the retina.

More than 10 years ago, it was found (M. A. Ostrovskiy and A. P. Kayushin, 1963; Cope et al., 1963) that a signal of electron spin resonance (ESR) is recorded in MPG, which increases under the effect of visible light; when light is turned off it returns to the initial dark level (dark signal). Studies have shown that the kinetics of accumulation and breakdown of photo-induced paramagnetic centers in tissues of the pigment epithelium present an exponential function. It is assumed that paramagnetism phenomena are related to the fact that MPG are in a free-radical state (Ostrovsky and Sakina, 1978). Taking this into consideration, we tested the effect of inhibitors of free-radical processes (IFRP) of the 3-oxypyridine class on intensity of the dark ESR signal recorded in experiments with MPG. It was established that the intensity of the dark signal diminished with increase in concentration of 2-ethyl-6-methyl-3-oxypyridine IFRP). The kinetic curves and destruction of paramagnetic centers demonstrate an exponential function; they are characterized by formation of a plateau. It was also shown that, with increase in IFRP activity, there is increase in maximum number of reacting paramagnetic (dark) centers. At the same time, there was no change in response to photo-induced ESR signals under the effect of IFRP. This means that the nature of the dark and photo-induced ESR signal recorded in experiments with MPG of the eye is not the same. This is also indicated by the difference in dependence of these signals on medium pH. The dark signal increased significantly when pH was raised (from 4.0 to 12.0); under the same conditions there was virtually no change in the photo-induced signal. These findings are indicative of the heptaquinone [or semiquinone?] nature of "dark" MPG radicals. The question of nature of photo-induced paramagnetic centers of MPG requires further investigation. At the present time, intensive studies are in progress on the photo-induced role of MPG in cells of the eye's pigment epithelium.

In conclusion, it should be noted that the study of molecular, membrane and cellular mechanisms of damaging effect of visible light and protective effect of free-radical inhibitors constitutes a pressing task for experimental and clinical ophthalmology.

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## LIGHT-DEPENDENT ELECTRICAL REACTIONS IN CELLS OF SIPHONALES MARINE GREEN ALGAE

Moscow BIOLOGICHESKIYE NAUKI in Russian No 7, 1982 (manuscript received 22 Jun 81) pp 39-44

[Article by P. Perez Alvarez, A. A. Bulychev, M. Denesh and G. A. Kurella, recommended by the Department of Biophysics, Moscow State University imeni M. V. Lomonosov]

[Text] Studies were made of changes in membrane potential induced by illumination and dark in cells of Siphonales green marine algae. It was established that the electrical reaction of *V. ventricosa* to light bears some resemblance to the same reaction in another Siphonales alga, *Bryopsis plumosa*, in spite of the fact that they differ appreciably in size and polarity of difference in electrical potentials between the vacuole and medium (positive potential of the vacuole in *V. ventricosa* and negative in *B. plumosa*). The electrical reaction to illumination has rapid and slow components, which differ in sensitivity to cooling and diurone [promeran?]. Exposure of *V. ventricosa* to the dark after illumination for more than 1-2 min induces temporary depolarization, which is 3-5 times greater in amplitude than depolarization induced by turning the light on. The light-induced changes in membrane potential change in sign during the period of the depolarization response. It is assumed that the complex nature of light-dependent changes in membrane potential of *V. ventricosa* is related to excitation of cells with changes from light to darkness.

Conversion of photic energy in chloroplasts of the plant cell is associated with changes in ion flux and electric potential difference on plasma membranes [12, 18]. Studies of fresh-water algae and higher plants [2, 10, 18] warrant the assumption that the photo-induced changes in membrane potential (MP) are attributable to changes in activity of the proton pump on the cell's plasma membranes and ion conductivity of membranes as a result of release of intermediate products of photosynthesis from chloroplasts into the cytoplasm. Marine algae differ appreciably from fresh-water ones in mechanisms of osmotic and ionic regulation [5, 8, 9, 12, 16, 17]. Little is known about the effect of light on ion transport in marine algae cells, as well as on their MP. The few data obtained for *Acetabularia* are indicative of significant differences in photo-induced MP changes in marine algae, as compared to the

response to light of fresh-water algae. The photo-induced response of *Acetabularia* cells is characterized by presence of rapid components in MP changes, which are related to the direct effect of light on the plasmalemma, as well as appearance of slow (so-called "metabolic") action potentials after the light is turned off [6, 17].

We studied the effect of light on MP of cells of Siphonales marine green algae--*Valonia ventricosa* and *Bryopsis plumosa*.

#### Methods

*V. ventricosa* plants were raised under laboratory conditions from maternal cells collected in the sublittoral region on the northern shores of Cuba, from a depth of 1.5-2 m. Formation of aplanospores in *V. ventricosa* is initiated by salt water when it reaches the central vacuole [4], and it can be readily induced by mechanical injury to the cell. The cultivation medium consisted of a solution of commercial sea salt in a concentration of 36 g/l. New cells are formed from aplanospores, and they reach a diameter of 1-2 mm in 3-4 weeks. We used such spherical cells in the experiment. *B. plumosa* plants were gathered in the Black Sea from the surfaces of rocks and cliffs at a depth of 0.5-1.0 m, and they were kept in Black-Sea water (salinity of about 18‰). In the course of the experiments, we used single branches of the plumose thallus of *B. plumosa*, about 2 cm in length and 200-300  $\mu$ m in diameter.

We measured the difference between electric potentials in the central vacuole and exogenous medium using standard glass microelectrodes filled with 2.5 M KCl solution. Membrane potential was recorded on automatically recording potentiometers using various electrometric amplifiers. In a number of tests, we inserted a second microelectrode in the *V. ventricosa* cells, which was connected through a load resistance of 100 M $\Omega$  to an ESL-2 stimulator output and used in combination with the external reference electrode to deliver 0.1-0.3  $\mu$ A electric current. The specimen was exposed to the full light of an incandescent lamp (OI-9 M lamp [fixture]). Illumination at the level of the object was 5000 lux.

#### Results

MP of *V. ventricosa* cells placed in salt water with 36‰ salinity constituted +40 to +50 mV (positive vacuole potential in relation to medium). In a medium with 18‰ salinity, nonilluminated *B. plumosa* cells have the opposite polarity of MP: -30 to -40 mV.

A study of photoelectric reactions induced by light in *V. ventricosa* and *B. plumosa* cells revealed that, in all instances, these reactions trigger components in the same direction in *V. ventricosa*, and their amplitude may vary. In some cases, there was a similarity between kinetics of MP changes in *V. ventricosa* and *B. plumosa* cells (Figure 1).

The photo-induced changes in MP can be consistently recorded for *B. plumosa* cells for 10-15 min after insertion of the microelectrode, and for *V. ventricosa*



for several hours and even a day. In the case of prolonged illumination of *V. ventricosa* cells, the potential demonstrates a stationary hyperpolarization level and, in a number of cases, declining [damping] MP oscillations (Figure 2).

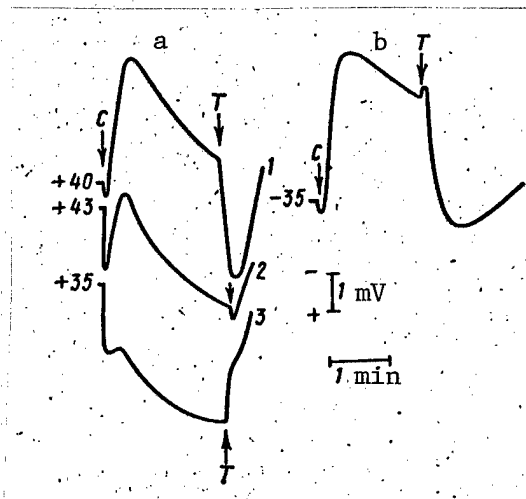


Figure 1.

Photo-induced MP changes in *Valonia ventricosa* (a), obtained in different cells (1-3) and *Bryopsis plumosa* (b). Here and in the next figures, the numbers near the curves indicate the dark level of MP; arrowheads C (light) and T (dark) show time when light was turned on and off

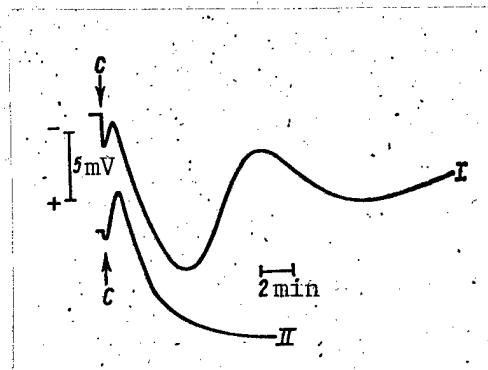


Figure 2.

Changes in MP of *Valonia ventricosa* cells during prolonged illumination I, II) different examples

The changes in MP in response to light and dark are about the same in amplitude when illumination intervals are short. When *V. ventricosa* cells are exposed to the dark after illumination for more than 2-3 min, there is temporary 7-15 mV depolarization of the cell (Figure 3a). It should be noted that the amplitude of the depolarization shift when the light is turned off is 3-5 times greater than the amplitude of depolarization induced by turning it on. The observed depolarization response has some analogy with the "metabolic" action potential that appears in *Acetabularia* cells with the change from light to dark, with regard to distinctive manifestations (appearance when light is turned off, significantly greater than amplitude of photo-induced MP changes) [6, 13, 15, 16]. During the period of the depolarization reaction, the direction of the photoelectric reaction of *V. ventricosa* cells is reversed (Figure 3b). Illumination of cells in this period elicits their hyperpolarization, in contrast to the stage of degeneration that is observed at the same time under control conditions in cells adapted to the dark. Brief depolarization or hyperpolarization of cells by 10-20 mV, which occurred as a result of passing current through the second microelectrode inserted in the cell, had no effect on the sign of the photo-induced changes in MP.

Cooling the medium to a temperature of 10-12°C led to decrease in amplitude of the photoelectric response of *V. ventricosa* cells and simplification of its kinetics (Figure 4). There was complete suppression of depolarization changes in MP in response to turning the light off. The effect of temperature is reversible: after the medium is heated to 20-22°C, there is restoration of photo-induced MP changes.

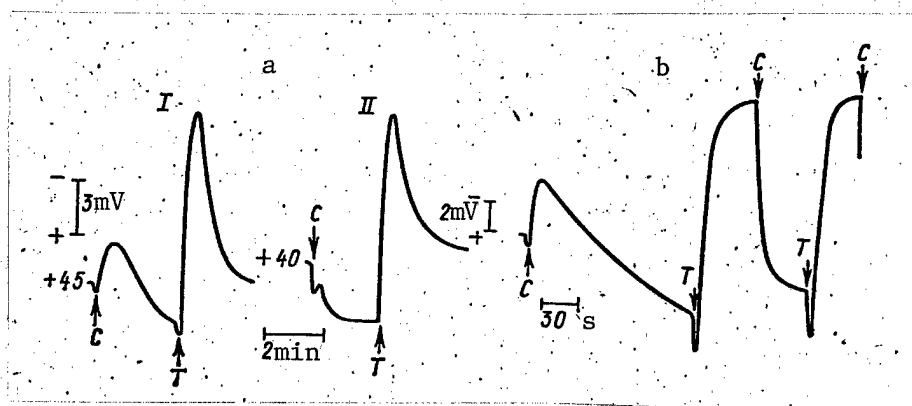


Figure 3. Electrical reaction of *Valonia ventricosa* cells to turning light on and off (a), and change in sign of photoelectric reaction of cells during period of depolarization response induced by light-dark change (b). I, II--different examples.

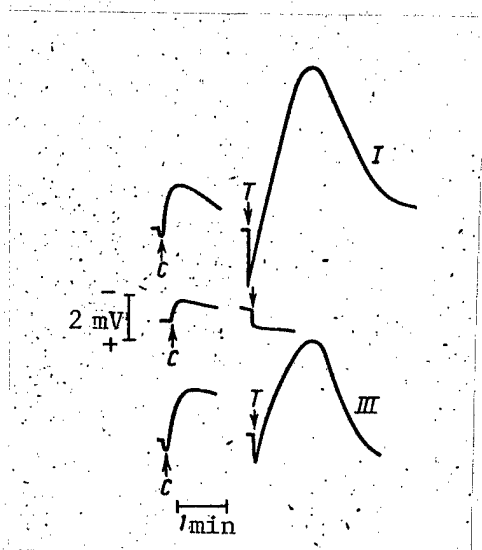


Figure 4.

Electrical reaction of *V. ventricosa* cells to change in lighting conditions at room temperature (I), with cooling to 12°C (II) and with subsequent heating to 20°C (III)

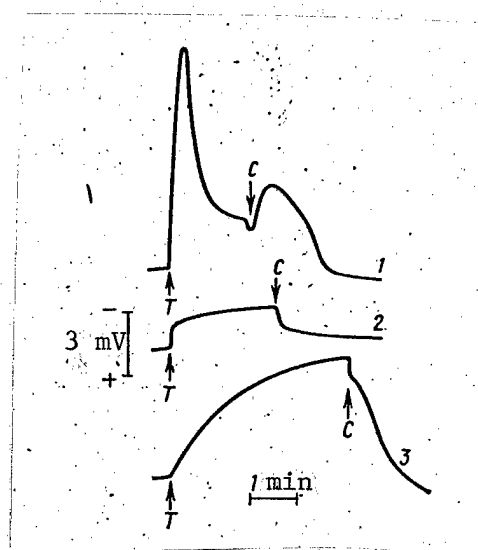


Figure 5.

Effect of diurone and phenazine methosulfate on photo-induced MP changes in *V. ventricosa* cells:

- 1) control
- 2) after addition of diurone (1.0-10<sup>-5</sup> M)
- 3) with subsequent addition to medium of phenazine methosulfate (1.0-10<sup>-4</sup> M)

Figure 5 illustrates photo-induced MP changes in *V. ventricosa* cells under control conditions, as well as in medium with 10<sup>-5</sup> M diurone and 10<sup>-4</sup> M phenazine methosulfate. The MP changes that occur within a 1-min interval are suppressed in the presence of

diurone. Subsequent addition of phenazine methosulfate to the medium leads to restoration of slow photo-induced MP changes.

## Discussion

The results of these studies show that, in marine green Siphonales algae, which differ appreciably in morphology, distribution of ions between the medium and different cell compartments and, mainly, in polarity of difference between electrical potentials in the vacuole and medium (membrane potential), the MP changes in the first few minutes after illumination are characterized by rapid and slow components of the same direction (see Figure 1). The amplitude and duration of these components vary somewhat from specimen to specimen, and they differ by several times in algae of the two species in question. However, this is not difficult to explain, considering the morphological distinctions, particularly, the proportion between volumes of different compartments in cells differing in size and age, let alone species, and the difference in configuration.

In this case, what is relevant is expressly the similarity of direction and sequence of phases of photo-induced reactions, since they occur against a background of MP of reverse polarity. The unusual polarity of *V. ventricosa* MP (positive vacuole in relation to medium), as compared, for example, to *B. plumosa* [7, 14] is also generally related to the differences in ion composition of vacuolar juice, as well as function of different ion pumps, which means the gradients of electrochemical potential for different ions. Without dwelling here on the causes of these distinctions in *V. ventricosa* cells, we can note that the demonstrated finding indicates that the photo-induced MP changes cannot be the result solely of changes in passive conductivity of cell membranes. Under any conditions, the distribution of ions and MP is apparently largely determined by electrogenic, active transport processes. Photo-induced MP changes are also related in essence to changes in the system of active electrogenic transport, and this is properly true for all green cells.

*V. ventricosa* cells have several substantial advantages as an object of investigation. It was found that they are relatively easy to maintain in culture and reproduce under laboratory conditions far from their habitat. The spherical cells of *V. ventricosa* (unlike the compound plumose branches of *B. plumosa*, which must be separated, thereby traumatizing the specimen) permit stable recording of MP with an inserted microelectrode for 24 h; their size permits insertion of two or more electrodes; for this reason they are convenient for assessing changes in cell membrane resistance, determining voltage and perfusing vacuoles. For this reason, we concentrated mainly in the described study on photoelectrical reactions of *V. ventricosa* cells.

One of the distinctions of the photo-induced MP changes in cells of marine algae, as compared to fresh-water algal cells, is that the changes in potential occur without a noticeable latency period. Fast components in the photoelectric reaction of marine algae were first discovered in *Acetabularia* cells and, in the opinion of some authors [15, 17], they are attributable to the presence of nonphotosynthetic pigments in the cell membrane. As can be seen in Figure 5, the relatively fast stages of MP changes in response to light and dark persist in the presence of diurone, which depresses photosynthetic

activity of the cell. These findings indicate that the photo-induced MP changes are complex, and that the fast and slow stages of photoelectrical reactions are based on processes that differ in sensitivity to diurone.

The high-amplitude depolarization induced by turning light off is of special interest (see Figure 3a). There is a resemblance between the depolarization response of *V. ventricosa* cells and the so-called metabolic action potential, which is induced under similar conditions in *Acetabularia* cells. The capacity of *V. ventricosa* cells for excitation is confirmed experimentally: when direct output current with density of about  $30 \mu\text{A}/\text{cm}^2$  is passed through the cell, one observes rhythmic fluctuation of MP at a frequency of  $5-6 \text{ h}^{-1}$  [3]. Probably the high-amplitude depolarization of cells in the dark is an active electrical response of the action potential type. The complete suppression of the depolarization response under the effect of lowering temperature and use of diurone indicates that this response, like the action potential of *Acetabularia* cells, is closely related to metabolism, in particular, photosynthetic activity of the cell. During the period of depolarization response, the sign of the cell's photoelectrical reaction changes (see Figure 3b). As shown by the experiments where current was passed through the cell, the change in sign of photoelectrical reaction in the depolarization response is not a direct consequence of MP shift.

Thus, the data obtained for *V. ventricosa*, which is an unusual object in many respects, are essentially consistent with the results described for Charophyta algae [1, 11]. In our opinion, this shows that electrical processes induced by illumination are closely linked with processes of cell excitation, and such a correlation is universal in green plant cells.

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## ENVIRONMENT

### PROTECTION OF BIOSPHERE EXAMINED BY ESTONIAN HEALTH OFFICIAL, SCIENTIST

Tallinn KOMMUNIST ESTONII in Russian No 4, Apr 83 pp 44-49

[Article, published under the heading "We Reply to a Question Asked on Political Education Day," by Candidate of Medical Sciences O. Tamm, ESSR deputy minister of health, and Candidate of Medical Sciences S. Etlin, in charge of the atmospheric air toxicology laboratory of the Tallinn Scientific Research Institute of Epidemiology, Microbiology, and Hygiene: "The Social Aspects of Environmental Protection"]

[Text] Man is not a closed system: he is in constant interaction with diverse natural and social factors of the environment which surrounds him. Some of these factors are favorable, while others are harmful or even dangerous. Consequently protecting man, and not only man but all living things, from unfavorable conditions or reducing negative consequences to a minimum if such conditions happen to arise would seem to be one of the most important tasks of any society. In this article we shall be discussing protection of the environment or, as it is also called, the biosphere, the basic foundation for man's existence.

We must state that people understood the need for environmental protection long before our day. More than 700 years ago, for example, the English parliament passed a law prohibiting the use in London of certain grades of coal, the burning of which generated particularly harmful combustion products. And in the middle of the last century Russian materialist philosopher D. Pisarev, an ardent fighter for liberation and education of the people, wrote that all the efforts of a reasonable man should be directed not toward repairing and caulking his organism like a frail boat built with holes but rather toward arranging for himself a way of life whereby the organism would become disordered as little as possible and consequently would need repair less frequently.

Everybody is familiar with the attention which the founders of Marxism-Leninism devoted in their writings to matters pertaining to man's activities and their relationship with nature. In particular, F. Engels wrote in "Dialectics of Nature" that "we shall not, however, become excessively carried away by our victories over nature. It takes vengeance upon us for each such victory. Each of these victories, to be true, has first and foremost those consequences on which we were counting, but in the second and third place has quite other, unforeseen consequences, which very often destroy the significance of the first."<sup>1</sup>

He also discussed these interrelations in "Anti-Duehring," and we find the same thing, for example, in Lenin's "Filosofskiye tetradf" [Philosophical Notebooks].

The problem of protection of the biosphere has assumed unparalleled acuteness in the latter half of our century, however, due to intensive atmospheric pollution as a result of the rapid growth of industry. Suffice it to say that in recent decades approximately 9 million square kilometers of cropland and pasture have become desert because of this. Forests -- suppliers of oxygen -- are presently disappearing at a rate of 20 hectares per minute. As a result, the quantity of oxygen in the atmosphere is diminishing daily by 10-12 billion tons. On the other hand, carbon dioxide in the atmosphere has appreciably increased and is continuing to grow. We are all familiar with numerous cases of poisoning of rivers, lakes and seas, and the World Ocean is being polluted with oil, radioactive waste, and poisonous chemicals. The scientific and technological revolution encompassing many of the world's countries constituted the foundation of this industrial growth. While having given man many benefits, it also engendered a number of new phenomena, including the task of protecting man against numerous hazards with which he is threatened by further uncontrolled technological advance.

The task of environmental protection has become a global problem, since it affects all mankind. The acuteness of this problem will increase with each passing year if an intelligent collective solution is not found through planned and orderly international cooperation. The latter, however, presupposes first and foremost establishment in international relations of the principle of peaceful coexistence and prevention of nuclear war, which would inevitably result in a world catastrophe.

All this was strongly reemphasized by CPSU Central Committee General Secretary Comrade Yu. V. Andropov in his article entitled "The Teaching of Karl Marx and Certain Issues of Building Socialism in the USSR": "The greatest discoveries have been made by science, and technological advances capture the imagination. At the same time mankind has acquired many new things, including very complex concerns. Mankind has fully warranted concerns connected with aggravation of the raw materials, energy, food, ecological and other problems on a global scale. And the most important thing which concerns peoples today is the necessity of preserving peace and preventing a thermonuclear catastrophe. There is nothing more important than this at the international level for our party, the Soviet State, and all the peoples of our planet."<sup>2</sup>

In our country, where the guiding principle is everything for the good and happiness of man, concern for man's health and concern for decent living and working conditions are also a matter of paramount importance to the state. A leading position in this regard is occupied by environmental protection, which is viewed by the party and government as an integral component part of economic and social development. For the first time in history the task of protecting the environment is also incorporated into our Constitution.

A different situation is observed in the capitalist world.

Until recently a high gross national product growth rate was considered to be guaranteed evidence of advance by society in developed capitalist countries. Well-known economist J. Galbraith wrote that no other goal of society has been given more resolute support than economic growth, and no other indicator of a country's success has been given such practically unanimous recognition as annual growth of gross national product.<sup>3</sup>

But can one call a society flourishing and prosperous where economic growth is achieved at the cost of destruction of the environment and the public's health? Precisely this is the cost of economic advance and the fabulous profits of the capitalist masters. According to calculations by U.S. experts, since the war the population of the United States, for example, has increased by 40 percent, per capita consumption has risen approximately 6 percent, while pollution of the environment has increased by a factor of 10! Here is one of the results of this. Tests of blood samples taken from 29,000 U.S. urban dwellers indicated that their blood cannot be used for blood transfusion: it is so saturated with carbon monoxide that it could cause the death of a patient suffering from cardiac insufficiency. What economic achievements and material benefits can make up for the sad fact that more than 150,000 Americans and an equal number of Mexicans die each year as a result of an environmental pollution?

Measures in the area of environmental protection are extremely costly. In the capitalist world they can be carried out at the expense of a certain decline in the rate of economic development, that is, reduction in production of material goods, and this means decreased profit as well. But the magnates of industry do not wish to accept this. Of course one can compensate expenditures to prevent or correct environmental damage by raising prices on goods, that is, by passing on the increased costs of production to the consumer. But an entrepreneur can agree to such a move only if his competitors take like action. Otherwise he will go bankrupt. For the entrepreneur environmental protection is a wasted and losing enterprise.

It is precisely because of a disinclination to bear additional costs and to give up any fraction of their profits that companies vigorously oppose and seek to block passage of laws and regulations in the area of environmental protection. This is precisely the reason for the fact that the U.S. automotive industry, for example, for many years sought to avoid equipping cars with antipollution devices. Thus the interests of monopoly capital are by their very nature totally in conflict with society's desire to preserve the quality of the environment.

In the meantime in a number of countries pollution of the biosphere has taken on such threatening dimensions and has such pernicious consequences that voices are being raised with increasing persistence, pointing to the necessity of urgent steps to protect the environment and to change the essential substance of the term "standard of living." An American economist by the name of Mishan, for example, stressed that economic growth should not become an end in itself and that future implementation of a policy of economic growth in developed capitalist countries will most probably be more likely to foster a decline than a rise in the prosperity of society. He sees a solution in securing "positive correlations" between economic growth and prosperity, where an important role is assigned to environmental protection measures.<sup>4</sup> The practicalities of life,



wrote Gus Hall, general secretary of the U.S. Communist Party, are forcing the most sober-minded and farsighted people in the West to see the extraeconomic goals of man's aspirations and to pose the question: "What is more important? Profit for a few rich individuals or an environment in which life on our planet can continue?"<sup>5</sup>

Will conclusions and warnings of this type pertaining to the environment have any practical significance for bourgeois nations? One can state practically with complete confidence that they will not, at least as long as the toiler masses are not taking part in the campaign. This is confirmed in particular by the total failure of various committees and commissions established in the United States and other Western countries on problems of the environment, which can change nothing and limit themselves to ascertaining facts. Canadian-U.S. talks on combating so-called acid rain, which went on for more than two years, ended in failure. The recommendations of the well-known "Club of Rome" have of course also failed to produce results.

As already stated, in this country protection of the environment is an integral component part of economic and social development, that is, a component part of the socialist way of life. The same principle applies in the other socialist countries. When we speak of the task of maximum satisfaction of the requirements of society, we have in mind not only the designation of production but also a healthful environment, for the latter is also a most important element of people's needs. Therefore we consider the expenditures of the Slantsekhim Production Association, for example -- approximately 5 million rubles just on establishing a health protection buffer zone and on construction of an installation to trap hydrogen sulfide -- as directed toward meeting vitally important needs of the population of the fuel shale basin. If one considers the fact that in recent years a number of other costly measures in the area of environmental protection have been carried out just in this basin alone -- construction of local treatment facilities costing 15 million rubles, installation of electrostatic precipitators at the Akhtme TETs costing 3.5 million rubles, etc -- it becomes obvious how substantial are state expenditures of this category for the country as a whole. For similar work is in progress at all plants and factories where the industrial process causes environmental pollution. And a campaign is being waged both for clean air and for clean rivers, lakes, and seas. Suffice it to mention just such large and effective treatment facilities as are in operation at enterprises around Lake Baikal, on the Volga, Dnieper, Don, in major seaport cities -- Leningrad, Baku, Riga, as well as our Tallinn, and in other industrial centers.

It is by no means mere happenstance that of all the world's capitals, it is precisely Moscow which has the cleanest air and the most crystal-clear river water. Incidentally, this fact greatly amazes foreigners who visit Moscow. And their surprise is quite logical if we bear in mind that, for example, Europe's largest river, the Rhine, each year carries past the Bundestag building in Bonn 12.6 million cubic meters of solid waste, 7.2 million tons of mineral salts, 13.3 million tons of detergents, and 36,000 tons of iron. This enormous quantity of production waste from the Ruhr industrial region is transported by the river into Holland, where two thirds of the population uses its water. We should note in passing that here, on the Lower Rhine, 130,000 salmon were caught in the year 1885, while in 1971 Dutch housewives had begun

washing their clothes with mineral water brought in from Norway, since the water of the Rhine was causing skin rashes. We could also mention the sad fate of the Great Lakes in North America, which are extremely heavily polluted and poisoned, and therefore a substantial portion of these lakes has become dead. Incidentally, the people of New York, for example, also have to buy their drinking water at the supermarket. We could cite a great many other such examples.

The very character of the socialist mode of production presupposes careful, rational utilization of natural resources in combination with large-scale environmental protection measures. Public ownership of the means of production and a planned economy are a guarantee of successful implementation of this mechanism.

We shall note, however, that what has been stated above by no means signifies that the natural environment in this country and in the other socialist countries now meets the high standards we have set. In some areas the level of pollution is also fairly high. It is true that environmental quality standards regarding a number of items are higher and tougher than in the Western countries. For example, the maximum allowable (safe for human health) concentration of sulfides per cubic meter of air is 0.05 milligram in this country, while in capitalist countries it is 0.3 milligram. Soviet standards ensure a higher level of safety for the public, and it is naturally more difficult to ensure their observance.

Certain difficulties in carrying out environmental protection measures in this country are also due to the devastating last war. Naturally during and immediately after the war there was no environmental protection in this country. It was necessary to gear up as rapidly as possible and at any cost for the production of goods required for the battle front and to meet the basic needs of the civilian population. At that time approximately 11,000 large industrial enterprises were built in rear areas and rehabilitated in liberated areas. Only in the course of subsequent renovation did these enterprises begin to be provided with antipollution facilities. The enormous volume of the work involved of course also requires considerable time.

Special equipment, sometimes entire systems of facilities, measuring and testing equipment, etc., are needed for effective environmental protection measures. It is no easy task to set up manufacture of an enormous, in view of the size of our country, quantity of environmental protection equipment, as well as to train a sufficient number of specialists to operate this equipment, and such a task cannot be accomplished immediately.

All these difficulties are of an objective and temporary nature, and there is no doubt whatsoever that with purposeful activity on the part of our party and the Soviet State, all prerequisites and conditions for overcoming these difficulties will be created in this country in the very near future. It is bad, however, that one still frequently encounters deficiencies of a subjective nature: certain organizations and economic officials display irresponsibility in utilizing presently available capabilities and means for environmental protection. It is not enough to have large treatment facilities; they must also be correctly operated and their operations monitored. At some enterprises

preventive inspections and equipment maintenance are focused primarily on ensuring that production targets are met, while care and maintenance of environmental protection equipment is viewed as a secondary matter. There are frequent instances of production process violations, as a result of which there occurs a sharp increase in harmful emissions and discharges into the environment.

One is particularly troubled by delay in building environmental protection facilities. Such facilities in this republic include under-construction treatment facilities in Khaapsalu, Vyrú, Maardu, and Kunda, although these projects have both adequate financing and materials. A most resolute campaign must be waged against phenomena of this kind, including bringing administrative and criminal charges against the guilty parties. Regular newspaper coverage on progress in carrying out designated measures by enterprises and organizations could become an effective means of improving environmental protection efforts.

Practical experience indicates that in recent years many industry officials have been paying increasing attention to environmental protection issues. Measures being planned in this area are assuming an increasing scale and provide for solving many fundamental problems. And the important thing here probably is not only appropriate decrees and orders issued by higher-level organizations but also social factors and changes in people's awareness. Enterprises which pollute the environment are today simply without prestige. Young people entering the workforce to replace the older generation correctly believe that plumes of black smoke above an enterprise, for example, are an indicator of a backward level of production and prefer to work at enterprises with a cleaner and consequently more sophisticated and modern technology. In past years the phrase "education does not permit" bore somewhat of a shade of irony, while today it would reflect the actual situation, that is, a logical result of our advances in the area of culture, education, and overall socioeconomic development.

Nor should one ignore the following important factor. Man has become more mobile and considers quality of the environment to be one of the most important items in the aggregate of sociocultural benefits when choosing where to live (in addition, there are many people who for reasons of health cannot live in areas with polluted air). More and more frequently it is pollution of the environment which causes a person to look for a new place to live. For this reason matters of environmental protection should also be considered as one of the important elements of personnel policy and keeping a permanent workforce at enterprises. Man's disinclination to live and work in a polluted environment is a phenomenon which we are just beginning to recognize but which will be exerting a steadily greater influence on accomplishing tasks of future economic development.

Among the diversified measures in the area of environmental protection, extremely important is the question of choosing a site for building an enterprise. This is especially relevant to our republic, which is territorially small. Already today the ecological burden is very large on some areas. Let us take the fuel shale basin, for example. Here we have within a radius of approximately 70 kilometers very large shale processing enterprises and a number of power facilities and enterprises of other industries. Research we have conducted

indicates that, in spite of large-scale environmental protection measures, the level of pollution of the environment in this area continues to remain fairly high. Consequently a large volume of environmental protection activities must be carried out here.

In substantiating the possibility of building or expanding a given enterprise, design organizations usually submit calculations of projected pollution of the environment, bearing health standards in mind. One must acknowledge that as a rule they are correct and that the environmental protection measures specified by them indeed guarantee that pollution will not exceed the allowable level. But there is a problem here: frequently the health protection standards themselves are obsolescent. The fact is that elaboration of a new methodology of investigation which makes it possible to reveal more intensively and extensively the effect of a given substance on man's health is also usually accompanied by a revision of the corresponding health standard. This was the case with phenol, the standard on which is today 10 times stricter than it was up to 1975. And in actual practice environmental protection measures often prove to be not as effective as had been assumed.

What is the solution, for certain points of departure and standards must be used. This is true, but one should always make allowance for our relative knowledge. Unquestionably as we gain more knowledge about the effects of environmental pollution on man's health, standards will not be eased but will become tougher. Therefore obviously not only observance of current standards but also the endeavor to move sources of environmental pollution as far as possible from residential areas (10-15 kilometers or more) should become a fundamental principle until the problem of no-waste technology is resolved. That which today seems overly conservative may tomorrow become the standard. This will result in saving considerable amounts of money, since it will obviate the need for additional environmental protection measures. On the whole, however, we fully agree with the frequently expressed view that from an ecological aspect, for our republic the future should belong to industries doing the least detriment to the environment (electronics industry, instrument engineering, precision engineering, etc).

When discussing pollution of the environment, one most frequently stresses attention on harmful emissions by industrial enterprises, less frequently addressing other phenomena which, however, directly pertain to ecological problems.

Let us take, for example, such a gratifying fact as a steady rise in living standards and, consequently, a rise in the level of consumption. But the latter is connected with acquisition by the working people of a substantial quantity of one-time-use items -- chiefly packaging materials of paper, plastics, etc. And there has been a sharp increase in the percentage share of synthetic household waste, which is not biodegradable, as well as various household chemicals. All this is discarded or discharged as sewage, which leads to substantial pollution of the environment, especially in suburban areas. The problem of skillful organization of waste disposal in towns and cities using nonpolluting techniques and methods has become very acute today. In this republic this applies particularly to Tallinn, where the population is approaching the half-million point.

Noise is no less acute a problem. This is an insidious and highly dangerous foe. It has been determined that noise can shorten a person's lifespan by 8-12 years. A noise level of 80 db and above diminishes intellectual work efficiency, raises blood pressure by 20-30 mm, and causes changes in the electrocardiogram. All this dictates the necessity of instituting extensive measures in urban areas to combat industrial, transportation, and household noise.

Air and water pollution, a high noise level, and the complexity of building treatment facilities provide strong grounds for statements that it is ecologically inadvisable to allow excessive growth of cities. In this connection the policy adopted at the 26th CPSU Congress which calls for establishing a powerful production base in small towns and rural areas will have favorable consequences for the environment in the large, established centers.

A cautious attitude toward the natural environment and every possible protection of this environment, in addition to the above, also has enormous political significance. Our successes in this area once again demonstrate to the entire world the superiority of socialism as a system which is capable, in contrast to capitalism, of ensuring a high quality to the natural environment. A principle of economic development in this country is an intelligent combining of economic growth with environmental production. Implementation of an extensive system of measures to achieve a steady rise in living standards and creation of increasingly more favorable conditions for comprehensive development of the individual, highly-productive labor, improvement of health, rest and recreation of Soviet citizens, and development of education, science, and culture -- all that which comprises our socialist way of life -- is continuing in the 11th Five-Year Plan.

Party and government documents have stressed repeatedly that the entire aggregate of economic processes in this country, directed in the final analysis toward improving our people's living standards, will have a high degree of social effectiveness only under the condition of implementation of designated corresponding health and hygiene support measures.

#### FOOTNOTES

1. K. Marks and F. Engel's, "Soch." [Writings], Vol 20, pp 495-496.
2. See page 11 of this issue.
3. See Dzh. Gelbreyt, "Novoye industrial'noye obshchestvo" [The New Industrial Society], Moscow, Progress, 1969, page 218.[J. Galbraith]
4. See E. J. Mishan, "The Costs of Economic Growth," Frederick A. Praeger Publishers, New York-Washington, 1967.
5. G. Hall, "Ecology -- Can We Survive Under Capitalism?" International Publishers, New York, 1972.

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UDC: 629.162.84+628.16.085]:615.9:648.18

STUDY OF TOXICITY OF PRODUCTS OF TRANSFORMATION OF SURFACTANTS FORMED DURING  
DECONTAMINATION OF DRINKING WATER

Moscow GIGIYENA I SANITARIYA in Russian No 9, Sep 82  
(manuscript received 20 Jan 82) pp 33-36

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[Abstract] Studies have shown that ultraviolet radiation at 80 to 120 W/s·m<sup>3</sup> can achieve 10 to 15% destruction of surfactants. Therefore, to model optimal conditions of formation of toxic products, detergents treated with chlorine were subjected to 10% destruction by UV irradiation. The object of the study consisted of typical representatives of highly stable "hard" surfactants, including both those which do not form typical ions in water such as OP-7 and OP-10 and hydrolyzable surfactants which do form specific anions (anion-active) surfactants such as azolate A and sulfonal NP-1. The upper parameters of toxicity of the products formed were determined upon one-time peroral administration. It was found that the products of transformation of surfactants formed in the process of reagent treatment of water differed in their toxic dynamic properties from the initial substances and may have a significant effect on the functions of the body. The level of toxicity is determined by the structure and homologous specifics of the initial substances. A combination of chlorination and UV irradiation in a gas-liquid phase forms products having the maximum toxicity, six times more toxic than preparations treated with inorganic chloramine. The gas-liquid phase, determined by the presence of the surfactants themselves, contributes largely toward the formation of processes which transform the substances to more toxic substances.

References 4 (Russian).

[496-6508]

## BACTERIAL TRACER FOR HYGIENIC STUDIES IN THE AREA OF PROTECTION OF THE SEA FROM POLLUTION

Moscow GIGIYENA I SANITARIYA in Russian No 9, Sep 82  
(manuscript received 6 Jan 82) pp 60-62

POTRAVNOVA, R. S., Scientific Research Institute of Water Transport Hygiene, Moscow

[Abstract] This work is dedicated to selection of a bacterial culture, creation of an elective medium and determination of an optimal incubation temperature to study a bacterial tracer to determine the requirement for hygienic regulations for reducing the pollution of the sea by the navy. The author selected strain 7 of *Serratia marcescens*, which is nonpathogenic, brightly pigmented, not commonly found in seawater. In the process of the work a nutrient medium was created consisting of 100 ml of Hottinger agar, in which glucose, urea, yeast autolysate and iron sulfate were separately introduced. This produced bright pigmentation of strain 7. The iron sulfate is a strong stimulus for biosynthesis of the pigment. Aminoacids in a dose of 500 mg had no stimulating influence on pigment formation. The optimal incubation temperature was found to be 25°C, incubation time 96 hours. References 10 (Russian).  
[496-6508]

## INSTRUMENT FOR TRAPPING DUST AND SALTS IN THE AIR LAYER NEAR THE GROUND

Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR. SERIYA BIOLOGICHESKAYA in Russian No 6, Nov-Dec 82 pp 69-73

BEL'GIBAYEV, M. Ye., Tselinograd Department. Institute of Soil Science, Kazakh SSR Academy of Sciences, Tselinograd

[Abstract] The level of the Aral' Sea has fallen greatly over the past few decades, increasing the salinity of the sea and the surrounding land. Wind transport of salt is a genuine danger to agriculture in the surrounding areas. A simple instrument has been developed by the author's institute to trap dust and salt. It consists of a flask with two lateral openings, partially filled with distilled water. A baffle plate attached to the stopper in the top opening forces the wind blowing through the flask down toward the surface of the distilled water. Dust and salt particles carried by the wind strike the surface of the distilled water and are trapped. A simple pole with shelves can hold several such flasks at different heights above the ground to determine the dust and salt content of the air at several levels. Preliminary quantitative calculations indicate that during a dust storm with wind 10 to 12 m/s, the dead layer near the ground carries from 5 to 11 kg of salts along

per hour. Considering that there are 20 or more days with dust storms in the Aral' Sea area each year, the annual transfer of salts must be at least 5.0 to 10 tons per hectare. The instrument suggested in this article can help to produce quantitative and qualitative data on dust and salt transfer by the wind at levels up to 10-15 m above the surface. Figures 2; references 9 (Russian).  
[533-6508]

UDC: 581.9:528.7(575.3)

USE OF SPACE INFORMATION IN GEOBOTANIC STUDIES IN WESTERN PAMIR  
(GORNYY BADAKHSHAN)

Dushanbe IZVESTIYA AKADEMII NAUK TADZHIKSKOY SSR. OTDELENIYE BIOLOGICHESKIKH NAUK in Russian No 4, Oct-Dec 82 (manuscript received 28 Apr 82) pp 77-81

KURBANBEKOV, Z. K., KHASANOVA, S. and USACHEV, O. G., State Scientific Research and Production Center "Priroda", Tadjik Division

[Abstract] Space survey materials have been widely used in recent times in performing tasks related to the cartography of natural resources in mountain and plains territories in the USSR, including the intensively-utilized mountain and high mountain regions of Tadzhikistan. Large scale and medium scale cartography of the vegetation of the western Pamir has resulted from the practical needs of agriculture, particularly animal husbandry based on natural pastures. A comprehensive study of plant communities and determination of presently-unused pasture territories, improvement of low productivity areas and their involvement in the process can all be assisted by large scale geobotanic mapping. Large scale cartographic data have been reflected in small scale geobotanic maps. Medium scale geobotanic scale maps are required. This article outlines the basic results of thematic interpretation of space photographs of the Bartang section and neighboring territories characteristic of the geobotanic and other natural features of the western Pamir, which have formed the basis of geobotanic maps of the region. The great information content and high resolution of space survey materials have allowed most mapping operations to be performed under office conditions. The characteristics of the area are described. The results of the thematic study of the space information, using data from traditional methods as well, have allowed the boundaries of geobotanic contours on the map to be refined and the level of detail of the images increased. References 10 (Russian).  
[534-6508]



POOR SUPPLY OF FOODS FOR CHILDREN CRITICIZED

Yerevan KOMMUNIST in Russian 3 Apr 83 p 2

[Article by M. Balabekyan: "Dinners for Kids"]

[Text] "Children's Foods" -- a neon sign informs passers-by. Even those who have no children will hardly resist the temptation of entering this store. So we entered...

But what was it? Instead of a lively business, sad silence prevailed. There was not a soul in both sections of the store except clerks. Our appearance surprised them. That was understandable. The specialized store No 583/I "Children's Foods" in the southwestern housing area of Yerevan did not have anything attractive to sell except milk formulas "Malysh" and "Malyutka" and jellies with two kinds of cereals.

They have sunflower oil and butter, canned fish, caramel and sour cream in standard packages, which are usually available in ordinary food stores, and it does not make sense to go for them to a specialized store. What is the reason for such a poor selection of products for children's diet and why must one guess what the purpose of this store is by the sign which does not justify its specialization and not by various children's products exhibited in its window?

The required minimum of items for sale in children's food stores is not great. It includes only 35 products. Even they are not available. Stores of this specialization, at best, have from 10-15 types of products, barely one half of what has to be available to the customer.

Such a scanty assortment of products in the stores is a direct consequence of poor supply which is explained first of all by the absence of specialized production of children's foods in the republic, in spite of the fact that several years ago provisions were made for its development by the directing agencies of the Armenian SSR. This task was not fulfilled and so far 12 of the 35 items of children's foods are imported. These commodities come in limited quantities and irregularly.

As a result of this, distressed mothers are compelled to offer their children monotonous menus causing negative emotions and loss of appetite.

Good quality fresh products for children's diet became scarce, according to the manager of the specialized store No 23 of the food trade association No 1 of Leninskiy Rayon, M. Akulyan. To see it, it is sufficient to visit a store when popular mixtures "Malysh" with buckwheat flour, buckwheat groats, dry milk, etc., are put on sale. In an hour or so all of them are gone. They are replaced again by packages of unpalatable cookies and wafers with faded labels, and again there is no one in the store except half asleep clerks.

However, even the scarce products for children which are imported do not always reflect the broad potentialities of the country's industry producing children's foods. For example, out of the available four kinds of milk formula "Malysh" (with buckwheat, oats, and rice flour and oatmeal), only one or rarely two kinds are available. This is the result of poor organization of deliveries and insufficiently thought through preparation of requisitions. There is no reason to attribute this to limited funds. It is possible to have a variety of products within the limits of the available quantity.

Of course, it is not very pleasant to depend on suppliers who do not always deliver on time, but stores have to put up with this. Then there is only one way out to organize local production and to increase the portion of local supplies in the total volume of the required goods.

In the RSFSR, Soviet Baltic Republics, in the Ukraine and other places, industrial production of dinners, various cereals and mixtures for children of early and school ages was organized a long time ago, and selection of foods in specialized stores is much greater than in our stores.

To be objective, it should be said that something has already been done by the producers for improving the supply of the population with food products for children. For example, the Ministry of the Meat and Milk Industry of the republic has set up the production of 15 products of this specialty.

The situation in the canning industry is much worse.

The demand for fruit and vegetable purees of various kinds (apricot, peach, carrot, tomato, etc.), jams, preserves, local juices with vitamins which are just as good as the imported ones increases every year. It would seem that it would be up to the canning industry to consider the increasing demand and expand the production of these products.

However, nothing like that is happening, according to L. Sarkisyan, manager of the store "Children's Foods" No 583/I, who was just as unhappy as the customers, during the entire last year their store received these products only twice while such vitamin-rich products are vitally necessary for children, contributing to their normal growth.

What is the explanation for this passive attitude of the canned food producers? Perhaps it is the fault of the Ministry of Trade of the republic which did not prepare requisitions in time or incorrectly determined the needs?

In response to these questions, the deputy chief of the Foodstuffs Trade Administration of the Armenian SSR Ministry of Trade, V. Usenko, showed us an information sheet. Let us quote some of the figures.

In 1981, the republic's Ministry of Trade, on the basis of the demand, requisitioned 420,000 reference cans of apricot puree, however, only 200,000 cans were included in the production plan. Only one half of the plan of the first quarter of last year (50,000 cans) was fulfilled. The situation with the peach puree was not any better. From a requisition of 320,000 reference cans, only 100,000 cans were included in the plan. There was something really wrong with the carrot puree: not a single can was delivered by the canning industry out of 260,000 reference cans.

Judging by the cited data, the practice of planning the output of children's foodstuffs without consideration of the requisitions of the Ministry of Trade became common in the operation of the enterprises of the canning industry, which puts trade organizations in a difficult position and results in artificial creation of shortages.

It is necessary to put an end to it as soon as possible. The necessity of improving bilateral ties of trade and industry, strengthening of discipline in deliveries, and increase of the output of consumer goods were discussed at the November (1982) Plenum of the CPSU Central Committee and the December Plenum of the Central Committee of the Communist Party of Armenia. Then at the meeting of the Presidium of the USSR Supreme Soviet held on 12 January of this year, it was pointed out that the Soviets must take additional measures for increasing the production and assortment and improvement of the quality of consumer goods, particularly traditional commodities and items which are in demand by the local population.

It seems that an effective measure of influencing the industry must become an exacting control over the output of products for children on the part of planning agencies and permanent commissions of the Soviet People's Deputies.

I would like to mention another, in my opinion, quite important aspect. It is advertising. Skillfully organized, it must contribute to the shortening of the road from the producer to the consumer.

In the Ministry of Health, which is also vitally interested in the proper organization of children's nutrition, we were told about the following noteworthy fact: the milk formula "Detolakt" is much richer in vitamins than "Malysh" and other familiar formulas. However, as a result of the absence of advertising and inability to show its advantages, this new valuable food product for children is undeservedly ignored by the buyer.

It would be advisable to start advertising new products before they appear in the stores, using such mass information media as radio, television and the press. This should be done not only by the industry and trade agencies, but also by medical workers, primarily those health establishments which organize treatment and prophylactic care for children and mothers.

Solution of problems connected with satisfying the needs in products for children's nutrition by enriching their variety will, of course, entail the necessity of expanding specialized stores the need for which is felt by the population of Yerevan and other cities of the republic.

BIOLOGIC PRINCIPLES OF RATIONAL UTILIZATION OF FISH RESERVES OF INLAND  
BODIES OF WATER IN WESTERN SIBERIA

Moscow VOPROSY IKHTIOLOGII in Russian Vol 23, No 1, Jan-Feb 83 pp 165-167

IOGANZEN, B. G. and KRIVOSHCHIEV, G. M.

[Abstract] The 28th Combined Plenary Session of the Western Siberian Department of the Ichthyologic Commission of the USSR Ministry of Fishing Industry and the Institute of Biology of the Siberian Department, USSR Academy of Sciences was held 16 through 18 June 1981 in Novosibirsk. This session dealt with the problem of biological principles of effective utilization of fishing reserves of inland bodies of water in Western Siberia. Some 126 persons from 24 cities took part in the work of the plenum, including 8 doctors and 38 candidates of sciences, 2 Honored Fishermen of the RSFSR and 16 leading administrative workers of the fishing industry. The introductory speech was presented by the chairman of the Western Siberian Department of the Ichthyologic Commission, Professor B. G. Ioganzen, who noted that there are large numbers of waters available for fishing in Western Siberia. In Novosibirsk Oblast along there are over 5000 km of rivers, over 600,000 ha of lakes and the large Novosibirsk Reservoir. Participants in the plenum attended 6 schematic plenary sessions, hearing and discussing 84 scientific reports on: problems of effective utilization of the fishing reserves of inland waterways, pressing problems of the creation of balanced fish-complexes and their protection from unfavorable factors, efficient fishing-economy utilization of lakes, efficient fishing-economy utilization of the Chano-Barabinsk lakes, efficient utilization of reservoirs, effectiveness of wintering of fish in closed trench ponds, efficient utilization of rivers, description of the rivers of the Kuznets Basin and their present sanitary-biologic status. Docent A. P. Petlina discussed the work of the Western Siberian Department of the Ichthyologic Commission on coordination of biologic fishing industry research in the region for 1980-1981. The plenum approved the activity of the bureau on combining the efforts of scientists and practical workers in the development of biological principles of the fishing industry in Western Siberia. The materials of the plenum will be published by the Siberian Department of "Nauka" Press in 1982.  
[486-6508]

## SOCIO-PSYCHOLOGICAL RESERVES OF THE FOOD PROGRAM

Moscow PSIKHOLOGICHESKIY ZHURNAL in Russian Vol 4, No 1, Jan-Feb 83 pp 3-13

LEVYKIN, I. T.

[Abstract] Three groups of psychological problems relating to the recently adopted decisions for improving Soviet food supplies are discussed. Problems of consumer activities include growing expectations for living standards, increased pay, improved labor quality, and much increased demand for satisfaction of intellectual needs as opposed to needs of subsistence. Another factor involves Soviet attitudes toward waste prevention. A second group of problems relate to rural work attitudes. Mechanization and improved working conditions have become important factors affecting labor productivity. Whereas 2-3 decades ago the weak link in agriculture was technology, today it has become the human factor. Qualifications, reliability and interest in the final results of labor are all involved in labor productivity objectives of the Food Program. Governmental policies have had varying impact on motivation for primary work as opposed to private plot labor. Policies must be tuned to prevent excesses in the latter while preserving its role in producing labor-intensive crops. At the same time, the collective must be motivated to perform its primary work assignments for pay. The third group of problems are related to psychological reorientation of personnel to develop the entire rural complex, including infrastructure as well as immediate production facilities so that lasting progress will result. The psychology of rural leaders requires considerable study. References 13 (Russian). [550-12131]

## GENETICS

### WANDERING GENES

Moscow PRAVDA in Russian 15 Jul 83 p 3

[Article by Academician Yu. Ovchinnikov: "Wandering Genes--Topics Submitted for USSR State Prize"]

[Text] It is well-known that hereditary (genetic) information is contained in chromosomes. Every chromosome (mammals, including man, have several tens of them) contains a giant molecule of deoxyribonucleic acid (DNA). A segment of such DNA, which carries information about the structure of a protein is called a structural gene. For a long time, it was believed that each gene has a strict "inscription"--that it is always situated in a specific locus of a specific chromosome, which is why the genetic system is highly stable.

The validity of this thesis began to be questioned several decades ago, when the first information appeared about the mobility of some genetic elements. However, these findings did not obtain an explanation at that time and were viewed more as an exception to the rule. The fact of the matter is that researchers working with live cell genes were confronted with considerable difficulties. Each of them contains many tens of thousands of different genes and it was simply impossible to isolate a particular gene in pure form for chemical investigation. It is only the development of gene engineering methods that opened the way toward gaining knowledge about the structure and functions of individual animal and plant genes. Here, relatively small segments of animal cell DNA are spliced into the small bacterial chromosome (plasmid), forcing the bacteria to build up the "foreign" DNA segment. In this way, one can obtain large quantities of animal and plant DNA, individual genes.

Authors of the series of studies on "Mobile Genes of Animals" were among the first in our country to use gene engineering approaches and to start investigation of several fruitfly genes, which they isolated, which yielded an amazing fact: the location of these genes was utterly different in different specimens of the same species. Each such genetic element was represented in the cell by 20-30 elements. In unrelated organisms, virtually no elements were found that were in the same place on chromosomes. Even in close relatives, at least three elements had different locations. The elements these authors discovered were named "mobile dispersed genes," i.e., mobile and scattered over the chromosomes.

These studies were unprecedented. Being first conducted in three institutes of the USSR Academy of Sciences and published in 1977-1978, they were the

first to appear in the worldwide literature: it is only in 1979 that numerous works of U. S. scientists were published, which corroborated entirely the data of Soviet researchers.

Thus, there are many mobile genes in cells. Up to 20 different families were isolated from the genetic system of the *Drosophila*, and about a third of them were found by the authors of the above study. However, the total number of genes reaches 1000, with an average of 50 per family. It is significant that such genes were also found in mammals. Thus, the authors discovered in essence an utterly new class of genetic elements in animal cells.

Each of the mobile genes consists of several thousand elements. There are identical segments at both ends of each such element, and in many cases their structure was completely identified. These rather time-consuming and complicated experiments made it possible to comprehend how mobile genes are transferred from one site of the chromosome to another and, in addition, to learn how they function. Gene function refers to its capacity to control synthesis of ribonucleic acid (RNA). There are segments (promoters) that trigger RNA synthesis and regulate its intensity at the start of each gene. It was found that the segments situated at both ends of mobile genes are so arranged that, on the one hand, they provide for gene mobility and, on the other hand, they trigger gene function. Some of them have powerful promoters, as a result of which intensive RNA synthesis occurs on them.

Subsequently, another class of elements was isolated and described in the genetic system of mammals: short DNA segments, only 130-190 elements in length, but extremely numerous. Each cell contained 100,000-200,000 such elements, which were also scattered over the entire genetic system. These countless elements are mobile and their position on chromosomes changes in different organisms. Soviet researchers were the first to demonstrate and define the complete chemical structure of these elements too.

Of course, the foregoing does not signify that all genes are mobile. Ordinary genes have a strictly specified location on chromosomes, in accordance with the long-established laws of genetics. For this reason, the classical laws of genetics are by no means discarded. However, as we now know, there are several groups of genes capable of movement that are widely represented in all organisms. Their presence is probably one of the chief causes of individual differences between representatives of the same species.

Justifiably, the discovery of mobile elements in the genetic system is viewed as one of the principal achievements of the latest physicochemical biology and genetics. It is becoming increasingly apparent that the mobile elements of the genetic system serve as an important factor of biological evolution; their movements affect variability of organisms. Very many changes in the genetic system, which were previously interpreted as the result of replacement of some DNA elements by others, turned out to be in fact the consequence of insertion of mobile elements in new sites on the chromosomes. Reproduction of mobile elements and their movements create new genetic material, which can be used to form new genes. In other words, the mobile genes increase drastically the flexibility of hereditary properties of the organism.

Of particularly great interest is the role of these elements in functional disturbances of the genetic system that lead to formation of cancer cells. In recent years it became apparent that there are special genes in each cell of all organisms, that can cause change of a normal cell into a neoplastic one if their function goes out of control. These oncogens carry information necessary for synthesis of proteins that are involved in regulation of cell reproduction and growth.

Why do these genes become uncontrollable, causing cancerous degeneration? As far back as 1969, G. P. Georgiyev expounded a hypothesis to explain the mechanism of onset of tumors, which was later named the "promoter hypothesis." According to it, degeneration of a normal cell into a neoplastic one is attributable to the fact that one of the genes involved in regulation of its growth and reproduction gets under the control of an element (promoter) that is not regulated by the cell. By that time, it was already known that some tumors are caused by insertion of DNA of a tumorigenic virus into the DNA of the stricken cell. It was assumed that the virus has such an uncontrolled promoter which, if viral DNA is next to the oncogen, irreversibly triggers it, removing it from the control of the cell. The oncogen starts to function and the cell becomes cancerous. Ten years later, it was experimentally proven in several laboratories that this scheme applies with onset of certain tumors caused by tumorigenic viruses. Thus, the promoter hypothesis was found to be valid, at least for a number of tumors.

The same hypothesis postulated that, in the presence of damage to DNA caused, for example, by carcinogenic chemical compounds, there could be accidental transfer of some uncontrolled promoter to the oncogen. The result would be the same, onset of neoplastic growth.

Mobile genetic elements could play an enormous role in this process. If such a genetic element is found to be next to a given gene after it moves, it could trigger the latter to function actively. If this gene is an oncogen, a normal cell will change into a cancerous one. In this regard, of exceptional interest are data of authors who demonstrated an amazing resemblance between mobile dispersed genes and tumorigenic RNA-containing viruses.

Indeed, when a mobile gene is connected with an oncogen experimentally and a cell is infected with such "chimeric" DNA, it changes into a cancerous cell in many instances. Thus far, the mechanism of inception has been studied with regard to very few tumors, and then not completely; however, it is already apparent that mobile genes could be involved in appearance of some of them.

Thus, the discovery and study of mobile genes of animals not only altered appreciably conceptions about the arrangement of the genetic system of animals, including man, but opened up new inroads to understanding of the mechanisms of onset of neoplastic growth. This cycle of studies is of outstanding significance, and its authors have been deservedly submitted as candidates for the USSR State Prize.



## REPLICATION OF HYBRID PLASMIDS CONTAINING POLYOMA VIRUS GENE IN YEAST CELL

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 267, No 5, Dec 82  
(manuscript received 11 Jan 82) pp 1237-1239

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[Abstract] Hybrid plasmids were constructed containing DNA fragments of the mouse polyoma virus. The first DNA sequence of the polyoma virus (Py) is known. Hybrid plasmid pSP97 was obtained by cloning of the full Py genome. The plasmid pSP155 contains at pBR322 the PstI-B fragment of DNA Py, containing the point of initiation of replication of Py DNA, as well as the gene *arg4*. The plasmid pPV540 was used to construct the plasmid pSP155. The structure of the plasmids pSP97 and pSP155 was established by restriction analysis. pSP97 and pSP155 were used to transform *S. cerevisiae* S2072 *arg4*. The effectiveness of transformation for pSP was 100-200 transformants per  $\mu$ g DNA, for pSP155--500-600, transformation frequency  $1 \cdot 10^{-2}$  and  $5 \cdot 10^{-3}$ . The plasmid pSP155, containing only the point of initiation of replication of the polyoma virus, though it does rather effectively transform S2072a, undergoes serious structural changes and does not assure stability and effective growth of the transformants. The plasmid pSP97, containing the full Py genome with intact viral replication system, is replicated in the yeast cell and provides stable transformants with effective growth and does not undergo restructuring. Figures 2; references 8: 1 Russian, 7 Western.

[532-6508]

## CHANGES IN STRUCTURE OF M- AND NS-GENES IN PROCESS OF INFLUENZA VIRUS ATTENUATION

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 267, No 5, Dec 82  
(manuscript received 27 Aug 82) pp 1240-1243

ZHILINSKAYA, I. N., KOZLOV, Yu. V., KURMANOVA, A. G., RUMOVSKIY, V. I., and BAYEV, A. A., academician, Institute of Molecular Biology, USSR Academy of Sciences, Moscow; All-Union Scientific Research Institute of Influenza, Leningrad

[Abstract] A study was made to determine what gene or genes of the influenza virus are changed in the process of attenuation, i.e., to determine the degree of virulence. Electrophoresis in polyacrylamide gel of virion RNA and oligonucleotide mapping of individual RNA segments were used to study the structure of the influenza virus genome. The attenuated virus was obtained by a series of passages through chick embryos. The process of passivation of the virus in a host foreign to it, like recombination, is an effective method of producing an attenuated influenza virus. Changes in the structure of individual genes of the influenza virus during the process of attenuation were analyzed using the more sensitive oligonucleotide mapping method. This method revealed changes in the structure of only two genes--M and NS. Changes in the structure of these genes were seen both in comparison of virulent and attenuated viruses and in comparison of intermediate variants (11 and 16 passages). The greatest changes were observed in the intermediate variants. These great changes reflect apparently not only the development of mutations, but also an increase in the degree of heterogeneity of the virus population with subsequent selection of variants with a given structure M and NS genes optimal for successful reproduction in the new host. This indicates an important role of these genes in the process of adaptation of the virus to the new host and their relationship with the virulence. This indicates a need for further study of these genes. Figures 2; references: 12 Western.  
[532-6508]

UDC: 576.858.6+574.963.3

## DETERMINATION OF POSITION OF NUCLEOSOMES ALONG DNA BY MOLECULAR CLONING: MAPPING OF CORE PARTICLE POSITIONS IN MINICHROMOSOME OF SIMIAN VIRUS 40

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 267, No 5, Dec 82  
(manuscript received 12 Nov 82) pp 1268-1272

CHUVPILO, S. A., NEDOSPASOV, S. A., SHAKHOV, A. N. and GEORGIYEV, G. P., corresponding member, USSR Academy of Sciences, Institute of Molecular Biology, USSR Academy of Sciences; Institute of Bioorganic Chemistry imeni M. M. Shemyakin, USSR Academy of Sciences, Moscow

[Abstract] A new approach was used to solve the problem of specificity of location of nucleosomes along the viral DNA using methods of genetic engineering. Fragments of nucleosomal DNA from the minichromosome were subjected to

molecular cloning in a bacterial vector. Cloning was performed in the recently developed vector pUR222, ideally suited for amplification and subsequent rapid separation of DNA fragments up to 100-200 nucleotide pairs in length. For further description of the "library" of clones produced, a number of bacterial colonies were separately grown on a nutrient medium and the plasmids which they contained purified. The final stage of analysis allowing direct mapping of nucleosome positions is direct determination of the primary DNA structure of the inserted fragments. The method of molecular cloning used in the present work can allow precise mapping of possible locations of nucleosomes on coding and regulator segments of the genome, and can also trace changes in the nucleosomal organization in various stages of functioning of the viral chromosome. Figures 2; references 15: 2 Russian, 13 Western.  
[532-6508]

UDC 577.212.4

GENETIC CODE. CORRELATION BETWEEN STRUCTURAL ELEMENTS OF THE CODON AND AMINO ACID CHEMICAL PROPERTIES

Moscow BIOLOGICHESKIYE NAUKI in Russian No 7, Jul 82 pp 21-24  
(manuscript received 12 Mar 82)

YAGUZHINSKIY, L. S. and ANDREYEV, A. Yu.

[Abstract] The authors seek to add to knowledge of the correlation between amino acid properties and the nucleotides of codons, first by determining the elements of the structure of codons, the properties of which (the nature of its substitutions) that correlate with, for example, the hydrophilicity of amino acids, then by defining the precise roles of functional groups in the nucleotides, the different substituents of the pyrimidine nucleus that form the common element of all nucleic acids. The resulting code points to a direct correlation between the substituent nature and amino-acid hydrophilicity. Attempts at finding further correlations failed. Substituent position and number also correlated with a precise chemical parameter of the amino acid. The hydrophilicity of amino acids was also found to correlate with the first and third nucleotides of the codon, as well as with the second nucleotide that received the most attention in the study. Results suggested the possibility of an optimal genetic code, which awaits further research. References 13: 1 Russian, 12 Western.  
[566-12131]

## HUMAN FACTORS

### ALL-UNION CONFERENCE ON PROBLEMS OF COMPREHENSIVE STUDY OF MAN HELD

Moscow APN DAILY REVIEW in English 11 May 83 pp 1-6

[Article entitled: "In the Lens of Science"]

[Text] What is man? People have been trying to unriddle this enigma as long as they have existed. Man is analyzed from various aspects. For instance, his behavior may be studied as a chain of biochemical processes or as contraction of muscles, as a manifestation of a hereditary program or as a manifestation of an individual educated by the collective. Each of these positions creates its methods of research. There are methods of physical chemistry and methods of chemical physics. There is neurophysiology and social psychology. There exist quite new sciences, for example, ergonomics which studies man in the process of labor. There is also thanatology, which is aimed at studying death, and there are also such ancient sciences as surgery or pedagogy. Thousands of studies--descriptive, clinical and experimental--have been carried out. Wonderful results have been attained, but though the achievements are great, all of them still remain only a collection of separate information data.

The Scientific Council for Philosophical and Social Problems of Science and Technology of the Presidium of the USSR Academy of Sciences and the Institute of Psychology of the USSR Academy of Sciences held an All-Union conference on the problems of comprehensive study of man with the invitation of specialists from various fields of knowledge. What questions of studying man are the most pressing now? IZVESTIA correspondent Ye. Manucharova put this question to I. Frolov, Corresponding Member of the USSR Academy of Sciences and Chairman of the Council, a scientist well-known for his works in the sphere of the theory of cognition, sociology and ethics of science, philosophical problems of biology and problems of comprehensive study of man.

Increasing interest in man and his future is a distinctive feature of our time. It results from the in-depth processes taking place in our epoch. The course of world developments, and the growth of production and culture set new, enhanced demands to the "human factor of the economy". And the threat of world thermonuclear war and the aggravation of other global problems (the raw-materials, energy, demographic and ecological problems) put truly Hamlet's question "to be or not to be?" to man and human kind. The answer to this question depends on us, earthmen of the present day.

It is beyond doubt that struggle for nuclear disarmament is the principal task of today. On this road alone can the states and peoples gain security. This was said convincingly once again in the Appeal to All Scientists of the World signed by the most prominent Soviet scientists.

But when it comes to the question, whether our planet will remain populated, other aspects arise, too. At present it is exceedingly important for mankind to sensibly solve the problem of peaceful survival--it is necessary to get adapted to the environment which has undergone dramatic changes in the past few years.

One should not turn a blind eye to the fact that the amount of toxic substances in the environment, in which man lives, has increased. Work with up-to-date technology is frequently linked also with stresses, with utmost intensification. All these factors influence the organism of man, his psychics [mind?] and heredity.

The man of the future will certainly unprecedentedly expand his possibilities with the use of a great variety of means, including pharmacology and psychotherapy, and this will enable him to operate in most difficult conditions with full efficiency and without any damage to his health.

Such is the natural process of the development of people as species. Karl Marx showed that in the historical process man does not strive to remain something finally established but is in the state of absolute movement of development. According to Marx, developing the riches of human nature is an end in itself for man. Man, his development and his future constitute the main value and aim of social progress in socialist society.

Hence, the immense responsibility weighing on scientists of the present day who are engaged in studying life. Today the problem of man has made biology and medicine become ever more actively involved in the general process of the conversion of science into a direct productive force of society.

Biomedicine has immense influence on society, on the development of production (for instance, the introduction of biotechnology), directly on man (medical and pedagogical applications), and on the style of scientific thinking.

But the "biological boom" has not only humanist pluses but also minuses. Hosts of people judge and argue about the successes of biomedicine throughout the world, being afraid of science and of its accomplishment, and at the same time demanding that scientists more quickly unravel the secrets of life.

Great naturalist V. I. Vernadskiy voiced the idea which now finds ever greater confirmation. He said that "the growth of scientific knowledge of the 20th century quickly erases the boundaries between specific sciences. We ever more specialize not in sciences but in problems".

It is beyond doubt that human intellect, the mind, as a complex of conscience and instincts, is problem Number One in the sciences about living things, and, the greatest enigma. Studying the operation of the brain is directly linked

with the general decision of the question of correlation of the biological and the social in man's development. It is essential to determine ways and methods to actively influence man's intellectual activity.

Evidently the task is to learn how to make more effective use of the existing resources of the brain which lie in its inmost recesses (say, to speed up the operation of memory, to increase its volume, and to boost the capacity of showing altruism).

It is difficult to say now with certainty in which direction and, what is the main thing, in what ways its development will go on. To all appearances, it will not be one single method but a complex of methods with the use of which man will get a chance to make "reason exert reverse influence" on its own material basis, on the physiology of the brain. Physiologists themselves hold the same view.

We see the "reason's reverse influence" in the new trends and forms of the combination of neurophysiological research with technical and even behavioral sciences, which biocybernetics and ergonomics have produced in the past few decades. Cybernetic modelling of man's neophysiological mechanisms, their technical reproduction in computers, and development of an "artificial intellect" which could fulfill a wide range of functions of the natural intellect open up new opportunities and reserves for the development of man.

Man's intensive work in difficult conditions (specifically in operating modern equipment) shows how great man's potentialities are. At the same time, it becomes clear that psychological distinctions between people are quite substantial. Some people can do jobs which people of a different type should not be allowed to do—otherwise this would threaten catastrophe. Psychophysiological adaptation of mankind to the present-day environment is impossible without understanding what takes place in the course of the contacts of different people with the environment.

It would be very important to translate into reality the idea of "civilizing" man's mind. It is difficult to say whether this will be done in the near future. But, in my view, the comprehensive research into man's mind, which is already developing, gives serious grounds for such forecasts. The advances made by present-day science in studying the biology, genetics and thinking of man open up opportunities for influencing man's psychophysical development in conformity with the new tasks.

And how do people change in the course of that? Shall not we be replaced by a "superman" differing from the man of today in all respects? Shall not we enter a new stage of evolution when it will be possible to create man artificially through the use of genetic engineering and biocybernetics? I don't think so....

But the newest biomedical studies, including experiments of man, cause scientists not only to give thought to the responsibility to the coming generations, but also to work out clear and coherent legislative codes protecting mankind against manipulations with respect to heredity and mental processes.

These are not at all unjustified apprehensions. The book "Robbers of Reason" by Samuel Chavkin describes the monstrous forms which such manipulation may take. The author cites numerous examples of the forced changes in man's mind, conscience and individuality in some US clinics.

The understanding of the complexity and acuteness of this problem should not close the prospects for truly scientific research, otherwise this would also be a manifestation of social irresponsibility. The very idea of favorable influence on the brain should not be discarded.

The same can be said about genetic engineering. Heredity control is a very sharp instrument. And this makes it necessary to analyze the idea whether we do not unwittingly underrate the danger of uncontrolled investigation and technological uses of the genetic-engineering problems under capitalism.

But this does not mean that active interference in heredity for improving man's health is undesirable or fundamentally impossible. The successes of medical genetics open up ever wider opportunities. It is necessary to increase the scale of such work.

It is necessary to admit that our philosophers will work insufficiently on the problems of the ethics of the cognition of life and man. We must take into account the fact that not only genetic engineering work and the technological uses of its results are making fast headway in some countries but that serious attempts are being made there to exploit them in the ideological struggle against the forces of progress.

The science of man is now somewhere at the very beginning of its development, and what we know is immeasurably less than that we do not know. Not only evil intentions but also ignorance and an incoherently formulated and understood initial position can do irremediable damage in this field.

The stand of science presupposes also the working out of ethic norms. This stand must be based on the understanding of man as an individual and should lead to studying him in this light. It is the task of biology, genetics and psychophysiology of man to study the integral and combined operation of all his internal forces, the operation which is determined by social factors.

For the time being qualitatively heterogeneous methods coexist, as it were, only outwardly, "neighbor on each other" in the sciences dealing with life. Sometimes it so happens that new approaches preclude each other in research. That is why man still remains a "dismembered object" of cognition, and we can learn everything about him, except what forms the integrity of his biological and social qualities, that is, the true essence of the personality.

Representatives of various sciences--geneticists and neurophysiologists, psychologists and philosophers, sociologists and linguists, and others should take part in a joint research. The discussions, dialogues, and comparison of different views and scientific schools will make it possible to develop knowledge of life and man, to understand in what way his nature should change in a direction favorable for man. Social, ethical-humanist and individual

factors play the decisive role in this field. Man's "reserves" and "resources" in this sphere are inexhaustible, and they should be used for man's benefit, for the all-round and unhindered development of man. The efforts of our Party and of socialist society as a whole are directed as this.

Scientists of different specialties should draft a science-based program for comprehensively studying man, a program which would serve practice effectively. It is a fair guess that in the future this should acquire some organizational forms, for instance, establishment of an Institute of Man which could coordinate the implementation of the science-based program of comprehensive study of man.

(IZVESTIA, April 14. In full.)

CSO: 1812/314



UDC: 681.327.2:621.3.019.3

#### MATHEMATICAL MODELS OF INDICES OF OPERATOR ACTIVITY AT KEYBOARDS

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 2, Jan-Feb 83  
(manuscript received 9 Feb 81; after revision 1 Feb 82) pp 44-48

GRAYFER, R. S.

[Abstract] Keyboard operator error has been found to be the primary source of errors in modern technical systems. Two approaches have been developed to calculating operator rates: calculation of the number of errors per character and calculation of the number of errors per word or sentence. This article presents a mathematical model for evaluation of a man-machine system using a structural method. Five types of manual input devices are analyzed for operator input of data into a technical system. The types are distinguished by operations with varying levels of feedback. It is found that the optimal level of feedback can reduce the error rate of data entry from 4.2% incorrect words to 1.6% incorrect words under the particular experimental conditions used. Figures 2; references 11 (Russian).  
[512-6508]

#### EXPERIMENTAL MODELING AND STUDY OF OPERATOR ACTIVITY UNDER EMOTIONAL STRESS

Moscow PSIKHOLOGICHESKIY ZHURNAL in Russian Vol 4, No 3, May-Jun 83 pp 42-50  
(manuscript received 3 May 82)

SOLOV'YEVA, I. B.

[Abstract] To measure effects of real (as opposed to laboratory) stress on performance, the author assigned several types of tasks to experienced parachutists, to be done during free fall while the parachutist was also performing the normal required jump operations. The tasks included reading numbers from cards, observing instruments that measured elapsed time and altitude, and reporting on all activities conducted. Test variants included organized information gathering and random information gathering. Results indicated that stress factors were always reflected in the accuracy of performance, although the speed of task fulfillment improved with practice. The

effect of interference became more pronounced as relative operator efficiency improved. In all cases the operators' primary task of performing parachuting functions remained foremost in their consciousness. Typical errors included delay in perceiving numbers and incorrect number perceptions, with more errors occurring as difficulty increased. The probability of complete, accurate task fulfillment at the stage of adaptation increased, with accumulation of know-how from 0.1 to 0.35, in various methods of performance. Figures 2; references 17: 15 Russian, 2 Western.  
[549-12131]

## LASER EFFECTS

UDC 613.648:615.849.19]-07:616.831-073.97

### AUTOMATED ELECTROENCEPHALOGRAPHIC EXAMINATION OF INDIVIDUALS WORKING WITH LASER EQUIPMENT

Moscow GIGIYENA I SANITARIYA in Russian No 6, Jun 83  
(manuscript received 26 Oct 82) pp 51-54

KOMAROVA, A. A., GINZBURG, D. A., ZOTKINA, V. P., KHVASTUNOV, R. M.,  
TERENT'YEVA, Ye. M. and CHERNAYA, S. G., Moscow Scientific Research Institute  
of Hygiene imeni F. F. Erisman

[Abstract] A group of 20-49 year old individuals (60 men and 51 women) working with various laser devices was examined using computerized analysis of electroencephalogram curves. In addition to dispersed laser irradiation, all workers were exposed to constant and pulsed noise, to bright blinking light, various gases and metal dust. The results showed changes in EEG patterns of sub- and decompensated dysfunctions of meso-diencephalon brain structures. These changes occurred in 72% of the cases with clinically manifested disorders of CNS, and in 52% of healthy individuals. These workers represented definitely a high risk group and should have been under repeated EEG examinations. The most characteristic complaints of these subjects included: irritability, sluggishness, tiredness, sleeplessness, moodiness. Eye strain and eye-ball pain were reported often. Algorithms developed for evaluation of EEG speeded up the process and made it more objective. References: 6 (Russian).  
[715-7813]

MAIN FEATURES OF FORMATION OF THE DELPHINID (CETACEA) SKULL IN THE PRENATAL PERIOD

Moscow ZOOLOGICHESKIY ZHURNAL in Russian Vol 62, No 1, Jan 83 (manuscript received 13 Oct 81) pp 102-112

[Article by A. A. Kuz'min, Pacific Ocean Scientific Research Institute of Fisheries and Oceanography (Vladivostok), and W. F. Perrin, Southwest Fisheries Center (La Jolla, California, United States)]

[Text] Data are submitted on formation of the bony skeleton of the head of the killer whale, common dolphin, spotted and long-beaked dolphins in the prenatal period. A considerable similarity was found in development of the skull in these species, and this serves as additional proof of the opinion previously voiced in the literature of the monophyletic origin of Odontoceti. Formation of the dome of the dolphin and sperm whale skull is subject to individual and interspecific variability, and it shows signs of resemblance to Theromorpha reptiles. For the first time, a detailed description is given of the primordium and formation of the mentomeckelian bone of Odontoceti. There is discussion of the question of homologization of covering bones of the tectum of toothed whales.

In the opinion of a number of researchers (Miller, 1923; Howell, 1930; Sleptsov, 1968, and others), the overlapping of some bones by others occurred concurrently in the skull of toothed (Odontoceti) and baleen (Mysticeti) whales. On the basis of the results of his paleontological studies, Mchedlidze (1970, 1976) believes that telescoping of the skull of these cetaceans is a convergent phenomenon. This is in agreement of a comparative study of skull embryogenesis in the sperm whale (*Physeter macrocephalus*) and *Balaenopteridae* (Kuz'min, 1976, 1978). Researchers disagree, not only in this matter, but with regard to homologization of bones in the cerebral part of the skull and causes of significant differences inherent in the skull structure of adult toothed and baleen whales (Ridewood, 1922; Slijper, 1936; Sleptsov, 1940; Yablokov, 1964; Kuz'min, 1974, 1975, 1976; Kuzmin, 1976, and others).

In order to determine the structural distinctions of the skull of toothed and baleen whales, it is necessary to pursue a comprehensive study of its development in the prenatal period in numerous species. This is also important to future development of conceptions of evolution of cetaceans and defining their systematic place.

With regard to toothed whale species, embryogenesis of the skull has apparently been studied the most comprehensively in the sperm whale (Kuz'min, 1969, 1974, 1975, 1976, 1978, 1979; Kuzmin, 1976; Berzin, 1971; Blokhin, 1972), common dolphin (*Delphinus delphis*), white whale (*Delphinapterus leucas*) and porpoise (*Phocoena phocoena*) (Sleptsov, 1939, 1940, 1968). There have been detailed descriptions of the cartilaginous skeleton of the white-beaked dolphin (*Lagenorhynchus albirostris*), pilot whale (*Globicephala melaena*) and porpoise (Burlet, 1913, 1913a; Schreiber, 1916).

In this article, new data are submitted on embryogenesis of the skull of the killer whale (*Orcinus orca*), common dolphin, spotted (*Stenella attenuata*) and long-beaked (*St. longirostris*) dolphins, as compared to other toothed whales. Our objective was to find the typical structural features of the cranial skeleton, distinctions referable to changes in overall configuration of the skull and topography of its elements in dolphins in the prenatal period, and to assess the possibility of using the findings for investigation of evolution of these animals and their intraspecific structure.

#### Material and Methods

We examined the skull of embryos referable to the following species: *St. attenuata*—9 males (98, 125, 155, 203, 260, 310, 320, 405, 505),\* 2 females (635, 870\*\*); *St. longirostris*—5 males (95, 205, 390, 518), 2 females (209, 728); *D. delphis*—3 females (280, 360, 498); *O. orca*—1 female (180) and 1 male (1530).

In addition to the above material, we used data on topography of the tectum of dolphins obtained as a result of studies of the osteological collections of cetaceans in museums of the Zoological Institute, USSR Academy of Sciences (Leningrad) and Moscow University.

The material was processed in laboratories of the Pacific Ocean Scientific Research Institute of Fisheries and Oceanography and Southwest Fisheries Research Center in the United States. Embryos of small dolphins were collected by fishing vessels of the United States in the eastern part of the tropical zone of the Pacific.

Skull preparations were made by injecting its cavities with paraffin (Kuzin, 1975) and maceration in water (Zaslavskiy, 1966). Information about ontogenesis of the sperm whale skull cited in the "Results" section was taken from the works of Kuz'min (1974, 1975, 1976, 1978, 1979).

#### Results

We found that the degree of ossification and overall configuration of the skull of the smallest spotted and long-beaked dolphin embryos that we examined was dissimilar: in the spotted dolphin, the cerebral region was less round, the rostrum was relatively wider and foci of bone tissue in elements were larger; the cranium was larger in the long-beaked dolphin (Figure 1). There were two ossification foci in the spotted dolphin embryo between the supra-occipital and interparietal bones, whereas in the long-beaked dolphin embryo

\*Zoological length of tested specimens, mm, given in parentheses.

\*\*Neonate.

there was a segment of bone with different configuration adjacent to the supraoccipital bone and there was no ossification in the interparietal bone (Figure 1). There was rather dense ossification of the mandible of these embryos. There was meckelian cartilage over its entire length. Signs of asymmetry and telescoping (maxillary bones lying on the frontal ones) were well-marked in the skull of the compared embryos.

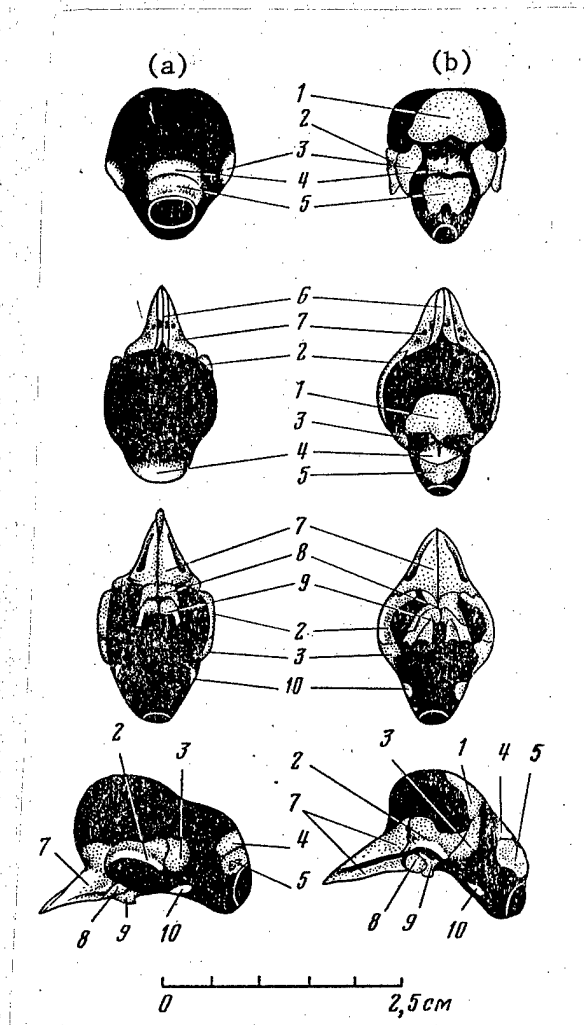


Figure 1.

Skulls of dolphin embryos

a) long-beaked, length 98 mm

b) spotted, length 95 mm

1) interparietal bone

2) frontal

3) parietal

4) squama ["table" bone]

5) supraoccipital

6) intermaxillary

7) maxillary

9) pterygoid

8) palatine

10) temporal

Substantial differences were found in ossification of the skull of the spotted and long-beaked dolphins at subsequent stages of embryogenesis also. Thus, the bones in the tectum were more adherent to one another, the maxillary bones overlapped the frontal bones more markedly, while the nasal bones were larger in the skull of a spotted dolphin embryo 155 mm in length (Figure 2), unlike that of a long-beaked dolphin embryo 205 mm long. The dorsal part of the supraoccipital bone was alate in the long-beaked dolphin embryo. There was a fontanelle between them and the interparietal bone, and in the dolphin species we studied this fontanelle closed essentially as a result of proliferation of surrounding bones, but in some cases there was an unpaired bone element primordium in its place (Figure 2, 11). Bearing this in mind, as well as the unique configuration of the supraoccipital bone in early-stage killer whale, spotted and long-beaked dolphin embryos, we assume that, in these species, as in the white whale and porpoise (Sleptsov, 1940), there is appearance of the primordia for a paired and unpaired bone in the occipital region of the skull, in addition to the supraoccipital and interparietal bones. Such bones were not encountered in each embryo of the same species: most often a paired bone was observed in embryos up to 200 mm in length, while the unpaired one sometimes remained alone up to the middle of the prenatal period (Figure 3).

The early stages of embryogenesis of the skull of the long-beaked and

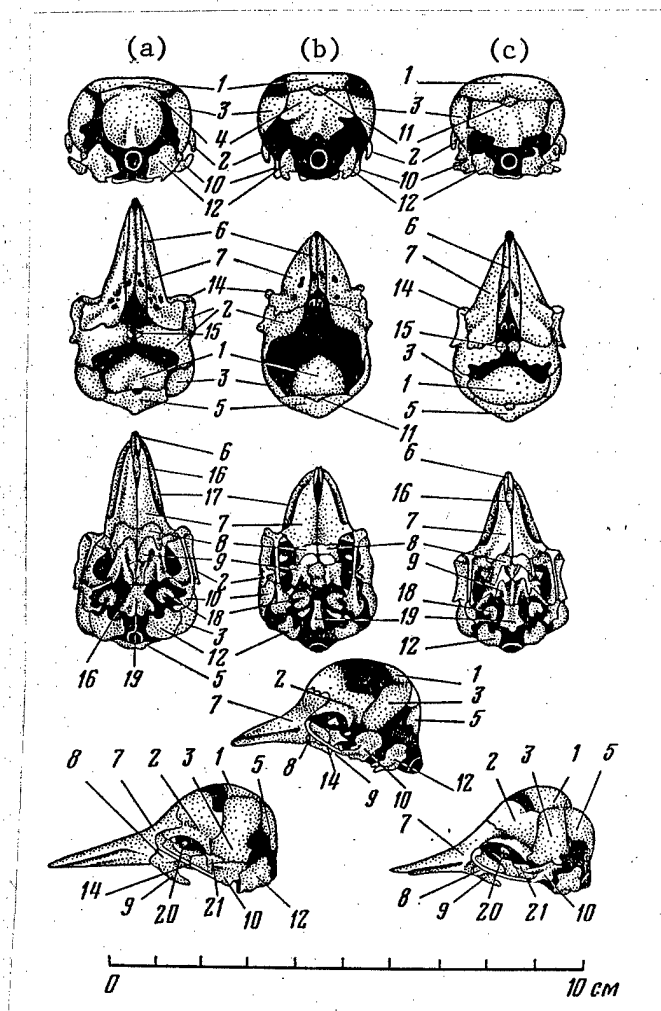


Figure 2.

Skull of dolphin embryos

- a) long-beaked dolphin, 205 mm long
- b) killer whale, 180 mm
- c) spotted dolphin, 155 mm
- 11) supraoccipital periosteal
- 12) lateral occipital
- 14) zygoma
- 15) nasal bone
- 16) vomer
- 17) dental canal of maxilla
- 18) tympanic bone
- 19) basilar occipital
- 20) orbitosphenoid
- 21) alisphenoid

Other designations are the same as in Figure 1.

spotted dolphins were characterized not only by interspecific, but individual variability. Interspecific variability was manifested by the uniqueness of formation of overall configuration of the skull, intensity of its ossification, shape and topography of elements, while individual variability was referable to number and configuration of bones forming the posterior and superior walls of the cranium.

In the examined embryos of the killer whale, dolphins and sperm whale, there is radial type proliferation of bone tissue in elements of the tectum from ossification centers, and it occurs in the following pattern: from front to back and bottom to top in frontal bones, up and back in the parietal and forward and to the sides in the interparietal bones.

According to the data of Sleptsov (1940), ossification of the interparietal bone in the white whale, common dolphin and porpoise originates from two centers that do not fuse for a long time. In view of this, we made a study of the structure of the interparietal bone of all embryos of dolphins, killer whales and common dolphins that we had. We failed to demonstrate any signs indicative of the possible formation of the interparietal bone from two ossification sites.

The parietal fontanelle closes when the body reaches 200-300 mm in length in the skull of spotted and long-beaked dolphin embryos. It also closes early in the killer whale and common dolphin. At subsequent stages of embryogenesis, in these dolphins the superior and lateral occipital bones gradually creep over parietal and interparietal elements, which is the reason for

the distinctive changes in their configuration (see Figures 1-3). The overall configuration of the skull changes, but there are no appreciable age-related differences in its lateral profile between the dolphins studied.

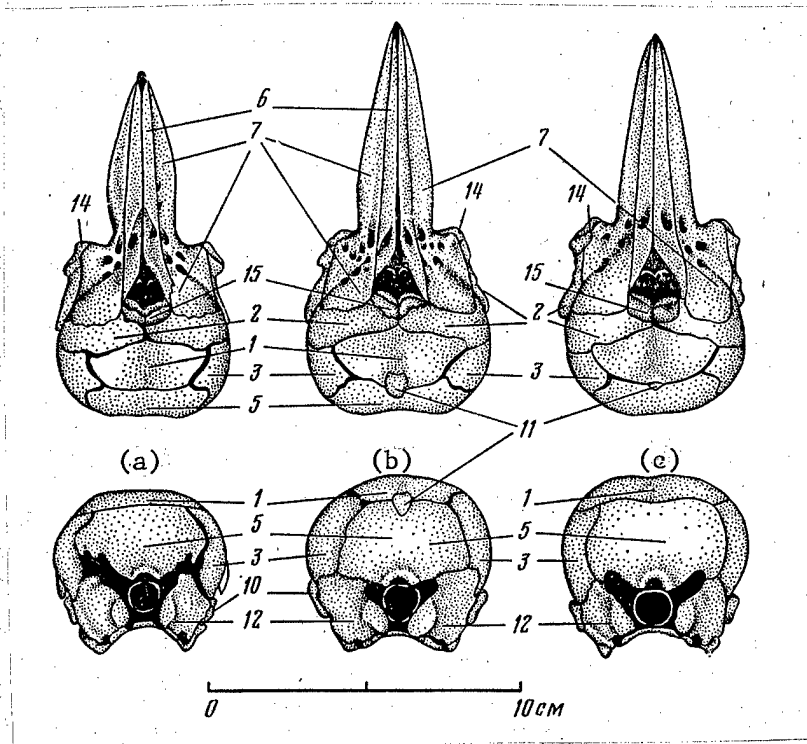


Figure 3. Embryo skulls of common dolphin 280 mm in length (a), long-beaked dolphin 304 mm in length (b) and spotted dolphin 310 mm in length (c); designations are the same as in Figures 1 and 2

According to our data, the mastoid fontanelles close only after birth in the skull of the killer whale, common and spotted dolphins. This is also inherent in development of the skull of the pygmy killer whale (*Feresa attenuata*) (Perrin, Hubbs, 1969). They close at the end of embryogenesis in the long-beaked dolphin and at the start of the second half of this period in the sperm whale. In the skull of a neonate spotted dolphin that we examined (870 mm in length), there were tiny bones in the mastoid fontanelles, three in the right and two in the left. These bones have been described in seals, and they are usually considered to be "accessory" occipital or fontanelle bones (Howell, 1929; Douth, 1942; King, 1956; Morejohn, Briggs, 1973, and others). There were two ellipsoid orifices in the supraoccipital bone of the same newborn dolphin, 15 mm above the occipital foramen. They were 17 mm apart. The right was 9×5 in size and the left 11×8 mm. Such foramina were not found in the skulls of the other dolphin and sperm whale embryos that we examined.



According to our data, there are three to seven, more often five supraorbital foramina in the right and left halves of the skull of the spotted dolphin; there are three to seven in the long-beaked dolphin and three to six in the common dolphin. These features are not subject to age-related variability. Evidently, they are a manifestation of epigenetic polymorphism and can be used for the study of intraspecific structure in these dolphins, as had been previously demonstrated for terrestrial mammals and pinnipeds (Yablokov, 1966; Timofeyev-Resovskiy et al., 1973, and others).

Maximum development of tectorial crests occurs in embryogenesis of the sperm whale. By the time of birth, their formation is at the early stages. In small dolphins, the external surface of the cranium remains smooth throughout embryogenesis.

We found no primordium for lachrymal bones in the small dolphins. It is quite probable that, in these cetaceans as in the sperm whale, they fuse very early with the zygomatic bones, ossification of which starts in the front in the small dolphins and they soon connect with the zygomatic process of the temporal bone. As the pterygoid process of the temporal squama proliferates, it invests half the tympanic bone on the lateral side and in front. In small dolphin embryos 250-300 mm in length, it reaches the pterygoid bone. In toothed whales, the latter has a complicated configuration. According to our data, in small dolphin embryos of the same size it is already joined with the frontal, palatine, vomer and basilar bones, and rests on the ventral surfaces of the alisphenoid and orbitosphenoid. Age-related changes in topography of the palatine and pterygoid bones presents species specificity in the dolphins studied, manifested primarily by their shape and dimensions throughout embryogenesis.

In small dolphin embryos 130-150 mm in length, the vomer is visualized on the side of the bony palate. In embryos of such dolphins, 200-250 mm in length, it adheres to the presphenoid and basisphenoid, and its caudal edge already reaches the basilar bone (Figure 2). Unlike the sperm whale, in the dolphins the vomer stops one-third from the end of the rostrum.

The early stages of ossification of tympanic bones occur in the small dolphins we studied when the embryos are about 120 mm long. During this stage of development, the osseous parts resemble a half-moon with its concave side facing the basilar bone. The malleus is formed in dolphins as a result of ossification of the caudal part of Meckel's cartilage. In spotted and long-beaked dolphin embryos 200-300 mm long, the dermoarticular bone is adherent to the malleus, and at subsequent stages of development it merges with the latter, while the malleus fuses with the sigmoid process of the tympanic bone. In embryos of these dolphins 350-400 mm in length, the stapes is rather firmly united with the petrous bone, the elements of which are already firmly attached to one another and to adjacent cranial bones. Unlike *Stenella*, in the killer whale there is less intensive formation of auditory bones. For example, in an embryo 1530 mm in length, all of the auditory ossicles were unattached, while the elements of the petrous bone could be readily separated from one another and cranial bones. This is also inherent in the sperm whale.

According to our data, in the killer whale embryo 180 mm in length, there was an elongated ossification focus between the tympanic, basilar and lateral

occipital bones (Figure 2). Here, there was a segment of round bone tissue in a spotted dolphin embryo 125 mm in length. We were unable to determine the skeletogenic basis of these ossification sites. In the course of development, they very rapidly merged with the ossified part of the basilar bone and formed a dilatation of its caudal end in the form of wings. Concurrently, there was proliferation in width of its anterior end. These age-related changes in configuration of the delphinid basilar bone in embryogenesis are also inherent in the sperm whale; however, no such "accessory" sites of ossification were observed in the base of its skull.

In the killer whale, spotted and long-beaked dolphins, as in the sperm whale, the basisphenoid and presphenoid are formed from three ossification centers. The ossification centers merge into the anterior and central sphenoid in *Stenella* when the embryos are 300-350 mm long, while the basisphenoid and presphenoid do not fuse throughout embryogenesis.

There is formation of a primordium for the mentomeckelian bone in the killer whale, common dolphin, spotted and long-beaked stenellas (Figure 4). It is formed by means of perichondral ossification of the anterior end of Meckel's cartilage. As the embryos develop, the mentomeckelian bone of these cetaceans shifts from the anterior end of the mandible to its middle. There is virtually identical formation of the mandible in embryogenesis of the killer whale and stenellas. The only difference is that there is one long tooth, the apex of which is oriented forward, on the anterior end of both the left and right mandible in the stenellas and common dolphin. In the course of development, this tooth is gradually invested in bone tissue. It is within the mandibles in prepartum embryos. The shift we demonstrated of the mentomeckelian bone and investment of the anterior mandibular tooth with osseous tissue in embryogenesis of delphinids is, in our opinion, indicative of intensive lengthwise enlargement of maxillae at the last stages of evolution of these cetaceans.

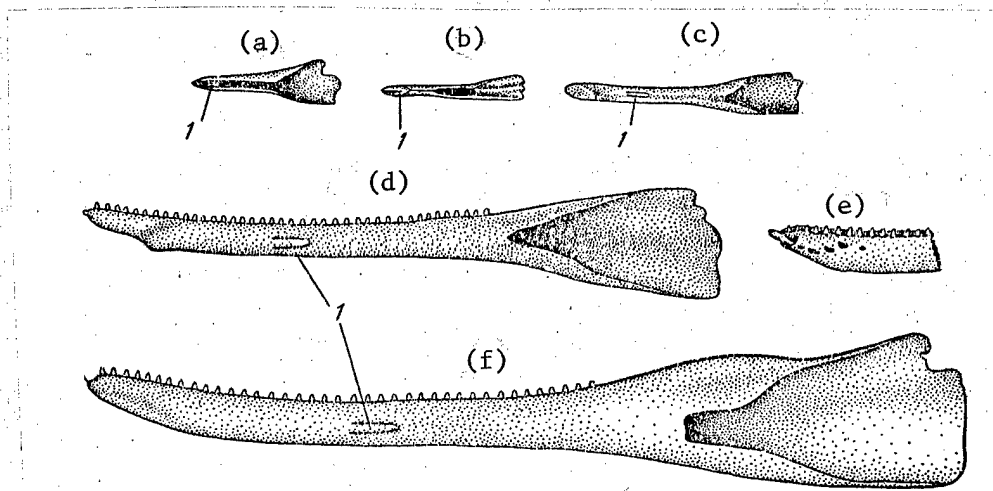


Figure 4. Structure of dolphin embryo mandible

- |                                   |                                    |
|-----------------------------------|------------------------------------|
| a) killer whale, 180 mm in length | d and e) same as (b) and (c),      |
| b) spotted dolphin, 180 mm        | 631 mm in length                   |
| c) same as (b), 260 mm in length  | e) neonate spotted dolphin, 870 mm |
|                                   | 1) mentomeckelian bone             |

In the dolphins we studied, the body and laryngeal cornua of the hyoid ossify from the same cartilaginous base, which is also inherent in the sperm whale. The lingular cornua of this bone do not ossify at all, whereas only the central segment of the dorsal branch undergoes ossification. Its proximal end remains cartilaginous throughout ontogenesis.

Thus, our studies of embryogenesis of the dolphin skull revealed that in them, as in the sperm whale, there is appearance of primordia and development of all of the main osseous components of the mammalian axis skeleton of the head as a whole. However, embryogenesis of their skull, unlike terrestrial mammals and pinnipeds, presents the following distinctions: there is no ossification of the ethmoid element, there is less marked fusion of the petrous bone with the temporal and lateral occipital; there is a primordium for the mento-meckelian bone and there are more membrane bones in the cranium, there is development of marked asymmetry and telescoping of the skull.

#### Discussion

In the opinion of Slepstov (1940), comparative anatomists were wrong in homologization of tectal bones of the dolphin skull and mistook the parietal bone for the interparietal and posterior frontal for the parietal. He based himself primarily on original findings from studies of embryogenesis of the skull of the white whale, common dolphin and porpoise. According to our data, in these species, as well as in the killer whale, spotted and long-beaked dolphins, there are primordia for twin and solitary bone elements between the supraoccipital, interparietal and parietal bones. According to our findings, the twin ossification center in the dolphin skull appears immediately in front of the supraoccipital bone, it proliferates to the right and left in the course of development and is fused with it without visible traces of a suture (Figures 1-3). There are also many features in common with dolphins and sperm whales in the formation of the supraoccipital bone (Kuz'min, 1975; Kuzmin, 1976). The demonstrated distinctions of the early stages of development of the occipital region of the skull of toothed whales are undoubtedly indicative of the fact that there was a paired bone element adherent to the anterior margin of the supraoccipital bone in the skull of their ancestors.

Supraoccipital membrane bones were found to be adherent to the dorsal edge of the superior occipital bone of reptile fossils (Romer, 1939; Rozhdestvenskiy, 1964; Shmal'gauzen, 1964, and others). Squamae ("table" or "plate" bones?) were connected to their lateral margins, while a twin parietal element was found anterior to the supraoccipital membrane bones, which are referred to in comparative anatomy surveys as posterior occipital ones (Kingsley, 1914; Shmal'gauzen, 1947, and others) in ancient terrestrial vertebrates. The squamae in the skull of theromorphic reptiles, for example, the Cynognathus, were connected to an unpaired supraoccipital membrane bone and surrounded, in the form of wide wings, virtually the entire supraoccipital bone on the sides and at the top (Romer, 1939). A comparison of age-related changes in configuration of the supraoccipital bone in toothed whales during embryogenesis (Kuz'min, 1975, 1976) (Figures 1-3) to the structure of the skull of theromorphic reptiles revealed a topographic similarity.

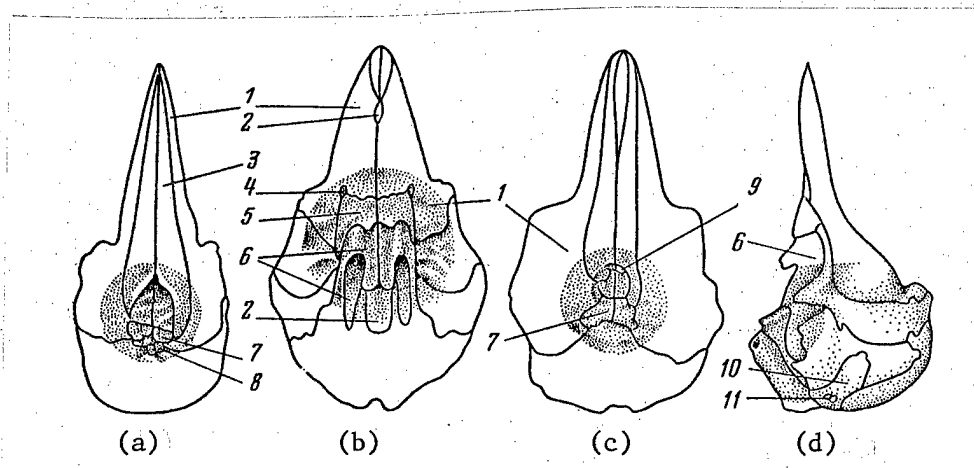


Figure 5. Skull of adult delphinids; bottlenosed dolphin (a), porpoise (b and c), bottlenosed dolphin (d)

- |                   |                                      |
|-------------------|--------------------------------------|
| 1) maxilla        | 7) nasal                             |
| 2) vomer          | 8) interparietal                     |
| 3) intermaxillary | 9) possible rudimentary ethmoid      |
| 4) "prepalatine"  | 10) supratemporal                    |
| 5) palatine       | 11) accessory (fontanelle) occipital |
| 6) pterygoid      |                                      |

In the dolphins and white whale we studied, the interparietal bone does not fuse with adjacent elements, and it shifts forward toward the frontal bones in the course of development (Sleptsov, 1939, 1949) (Figures 1-3). The interparietal bone was paired (Figure 5) in one out of 78 adult bottlenosed dolphins that we studied. In this regard, it is quite possible that the "accessory" bones repeatedly described for the frontal region of the mammalian skull (Doutt, 1942; Westoll, 1943; Hromada, Strand, 1962, and others) and the interparietal bone in delphinids are homologues of the same bones of vertebrate fossils. In addition, in a study of the skull of adult bottlenosed dolphins, we discovered an "accessory" paired bone in one instance. It bordered on the parietal, lateral and superior occipital and temporal bones, a place that is typical for the supratemporal bone of reptile fossils (Figure 5). Thus, the parietal bone in the delphinid skull is apparently a complex structure, with which the intertemporal and supratemporal elements fused in the course of evolution, and perhaps the same bones in vertebrate fossils. The occasionally observed separation of the right parietal bone in embryogenesis of the sperm whale (Kuz'min, 1975, 1976; Kuzmin, 1976) warrants the assumption that, in the course of evolution, there was fusion of parietal elements with temporal or posterior frontal bones in this species.

The following could serve as proof of the expounded hypothesis: the ossification centers in the parietal bones of higher animals appear at their base and then undergo radial type proliferation, mainly upward (Birikh, 1957; Tret'yakov, 1959; Jollie, 1968; Kuzin, 1970; Kuz'min, 1975, 1976; Kuzmin, 1976) (Figures 1-2).

On the basis of the foregoing, we believe that the unpaired bone element between the supraoccipital and interparietal bones, which is encountered in dolphin embryos of different ages, is a homologue of the supraoccipital membrane element of ancient reptiles. The bone shown in our figures of dolphin skulls and designated as interparietal (Figures 1-3) and the "accessory" bones described for the frontal region of the mammalian skull are homologues of the same bones of ancient vertebrates. The paired element, which appears in front of the supraoccipital bone of the dolphin skull is a homologue of squamae of extinct reptiles. In toothed whales, the parietal bone is a complex structure, which was formed in the course of evolution from elements of the parietal and temporal regions of extinct animals.

Presence of an ethmoid bone in the dolphin skull is mentioned in the works of Sleptsov (1939, 1940) and Agarkov et al. (1974). According to Burlet (1913, 1913a), it does not ossify at all in the porpoise. This is also inherent in ontogenesis of the skull of the sperm whale, killer whale, spotted, long-beaked and common dolphins (Kuz'min, 1975, 1976; Kuzmin, 1976) (Figures 1-3). A pre-sphenoid crest is well visualized on the side of the rostral recess in the skull of adult sperm whales, whereas in dolphins it is concealed under the frontal bones. The bony septum between the nasal passages of adult dolphins is formed from fused lateral lamina of the vomer. In this regard, it is interesting that there are small independent ossicles in front of the osseous choanae in the skull of some specimens of true and common porpoises (Figure 5). It is quite probable that the twin bones we found in the skull of adult specimens of two dolphin species are rudimentary ethmoid bones.

The distinctions in development of the skull of toothed whales at the start of ontogenesis (Kuz'min, 1975, 1976; Kuzmin, 1976) (Figures 1-3) lead us to question the presence of a direct link between contemporary toothed whales and ancient cetaceans (Archeoceti). This is indicated by absence in the latter of a mentomeckelian bone, which is typical of embryogenesis of the dolphin skull, and of the fifth bone in the occipital element, which is not fused with the lateral, basilar and supraoccipital bones in newborn sperm whales (Kuz'min, 1975, 1976; Kuzmin, 1976) (Figure 4). The mentomeckelian bone has not been described for theromorph reptiles either. However, we cannot rule out the possibility that the meckelian bone was undetected in studies of fossilized remainders of theromorph reptiles. For this reason, whatever the hypotheses expounded at the present time, following is apparent: in embryogenesis of toothed whales there are signs that are similar to structural elements of the skull of theromorph reptiles.

This summary of information on embryogenesis of the skull of the sperm whale, killer whale and small dolphins (Sleptsov, 1939, 1940; Kuz'min, 1969-1976; Kuzmin, 1976) (Figures 1-4) revealed that, in this period of development, their skull is characterized by many features in common. The principal ones are telescoping of caudal parts of the maxillary bones over frontal bones, well-marked primordium of squamae ["plate" bones] and supraoccipital membrane bones, open orbit, great similarity in formation of occipital and pterygoid-sphenoid complexes, and absence of ossification in the ethmoid. This is unquestionably serious confirmation of the opinion researchers have already formed about the monophyletic origin of contemporary toothed whales.

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ECOLOGIC-PHYSIOLOGIC SPECIFICS OF CARDIAC ACTIVITY OF THE CASPIAN SEAL  
(PUSA CASPICA)

Moscow ZOOLOGICHESKIY ZHURNAL in Russian Vol. 62, No 2, Feb 83  
(manuscript received 7 Dec 81) pp 280-286

GALANTSEV, V. P., STOSMAN, I. M., SHERESHKOV, V. I., KUPIN, A. G. and  
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[Abstract] A study was made of the ecologically determined specifics of cardiac activity in the Caspian seal. Cardiac activity was studied by electrocardiography, recording the ECG of the animals with a portable electrocardiograph in standard leads from the extremities and unipolar leads from various points on the body with the animal in a natural position. The ECG were recorded with the animals out of the water and in the water at a slight depth of 30 to 40 cm. The animals tolerated insertion of thin needle electrodes beneath the skin quietly. Respiration frequency was determined visually and also recorded on the electrocardiograph by means of an attachment. Three mature seals with body mass of 45 to 52 kg were examined, with a total of 25 ECG and 12 pneumograms being recorded. The animals acted quite quietly during the experiments, allowing the production of good quality ECG. Analysis of the 100 most typical heart-cycle sequences showed that during the period between two inhalation-exhalation cycles the variability of cardiac cycle length was quite great. Shortening of the cardiac cycle at the moment of inhalation-exhalation varies significantly less. The typical ECG wave shapes are described and examples of ECG recordings are presented. Bradycardia develops during the time the animal holds its breath, particularly when underwater. Tachycardia develops only during inhalation-exhalation, after which the length of cardiac intervals doubles or more. Figures 3; references 7:  
5 Russian, 2 Western.  
[541-6508]

## MEDICINE

### DETERMINATION OF PROTECTIVE PROPERTIES OF THE BODY

Baku DOKLADY AKADEMII NAUK AZERBAJDZHANSKOY SSR in Russian No 12, Dec 82  
(manuscript received 8 Jul 81) pp 70-74

MAMEDOV, A. M., Institute of Hematology and Blood Transfusion

[Abstract] The purpose of this article was to refine the protective properties of the human body based on the pain reaction, obtaining numerical and graphic data which could be used to objectivize subjective sensations. Above-threshold pain sensitivity was studied in dynamic order, referred to as the dynamic measurement of skin pain sensitivity. The two primary methods by which pain has been historically studied are briefly outlined. The method developed by the authors for studying skin pain sensitivity can within 25 minutes determine the tonus of nerve cells of the cerebral cortex, i.e., the protective properties of the organism. The injection of a solution of aminasine increases the inhibiting function of the reticular formation and it is found that nerve cells are partially suppressed in their response to peripheral irritants, decreasing the tonus of nerve cells of the cerebral cortex and decreasing the protective properties of the organism. By this method the tonus of cortical nerve cells is determined. Figures 4.  
[472-6508]

UDC: 612.821.2+612.822.3+612.825.4

### ASYMMETRY OF FUNCTIONAL STATUS OF CEREBRAL HEMISPHERE IN ADAPTATION TO NEW CLIMATIC-GEOGRAPHIC CONDITIONS

Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 9, No 2, Mar-Apr 83  
(manuscript received 8 Apr 82) pp 195-202

KOLYSHKIN, V. V., Institute of Physiology, Siberian Branch, USSR Academy of Medical Sciences, Novosibirsk

[Abstract] The functional status of both hemispheres of the brain was recorded in the process of adaptation, (8 healthy young people, 20-22 years old were first observed in Novosibirsk in June, then removed quickly to Kamchatka and observed in August-September), the functional interactions between hemispheres were studied and the significance of each hemisphere in the adaptive process

was determined. The task was to determine changes in functional asymmetry of the brain in the process of adaptation and compare these changes with changes in the functional status of the central nervous system, evaluated based on a number of psychophysiological and electrophysiological indices. The study consisted of two parts. In part 1 the subjects were presented dichotic lists of 14 words. Read at one word per second, with intervals of three minutes during which the subjects were to reproduce all the words they could remember. In the second part of the study the subjects were presented the opportunity to press a button at an arbitrary rate with the index finger of the right hand, thus recording their motor activity while performing the same task. The dichotic tests revealed the "right ear effect" (left hemisphere)--words presented to the right ear were better reproduced than words presented to the left ear ( $p < 0.01$ ). The results of the dichotic tests showed that words presented to the right ear (left hemisphere) were reproduced throughout the entire adaptation time significantly worse, words presented to the left ear (right hemisphere) significantly better during the adaptation time than during the initial study time in Novosibirsk (particularly on day 3). Environmental factors were thus found to have an influence on nervous processes in the left and right hemispheres. During the process of adaptation to new factors there was significant activation of the right hemisphere, a result of the significance of this hemisphere in developing afferent signals under these conditions and its close functional relationship with the emotional apparatus. Figures 4; references 23: 21 Russian, 2 Western.  
[490-6508]

UDC: 612.172-766.11

#### REACTION OF CENTRAL CIRCULATION OF HEALTHY MEN TO DECOMPRESSION OF VARIOUS BODY AREAS

Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 9, No 2, Mar-Apr 83  
(manuscript received 25 Dec 81) pp 237-241

KATKOV, V. Ye., CHESTUKHIN, V. V., NIKOLAYENKO, E. M., RUMYANTSEV, V. V., GVOZDEV, S. V., ZYBIN, O. Kh. and KOLPAKOV, Ye. V., Moscow

[Abstract] Studies of local negative pressure on both legs showed not only local effects, but clear effects on central circulation, imitating the normal orthostatic test to some extent. It is assumed that the effect of local negative pressure on central circulation depends, with otherwise equivalent conditions, on the anatomic-physiologic specifics of the decompression area. The purpose of this study was to compare the effect of decompression of various body areas on the central circulation and to study in more detail the changes occurring upon decompression of the area near the hydrostatic indifferent point. The study involved 8 healthy males following careful physical examination, mean age 33 years. Decompression of various areas of the body caused identical qualitative changes in the basic central circulatory indices. The area near the hydrostatic indifferent point was 3 to 4 times more sensitive to decompression. Due to certain anatomic-physiologic specifics, decompression

of an area is accompanied by accumulation of a significant volume of blood with a resulting decrease in the load on the right segments of the heart and an improvement in subjective perception of condition. Figures 3; references 10: 2 Russian, 8 Western.  
[490-6508]

UDC: 612.49+612.22:613.69.3

DIURNAL RESPIRATORY RHYTHM IN YOUNG HEALTHY PERSONS IN SIBERIA AND THE FAR NORTH

Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 9, No 2, Mar-Apr 83  
(manuscript received 6 May 81) pp 290-294

ARAKCHEYEV, A. I., Central Scientific Research Institute of Traumatology and Orthopedics, USSR Ministry of Health, Moscow

[Abstract] A study was made to determine the deviation in respiratory function, oxygen balance and acid-alkaline status in diurnal and seasonal rhythms under the influence of the extremal factors of the environment in the far north and changes in labor schedules. The respiratory function was studied among healthy persons in its diurnal rhythm (at intervals of 4 hours beginning at 7 am) and through the seasons of the year (beginning in winter). The studies were performed on identical groups of persons 18 to 25 years of age in various geographic zones (Novosibirsk, Noril'sk, Dikson). The subjects were restricted to bedrest the day before and during the day of the study to eliminate the influence of physical loads and nutrition. The change in external respiration during the course of the day was found to correlate with physical activity and serve adaptation to labor activity. In persons working in the evening and night there was a shift in the diurnal indices of respiration, oxygen balance and acid-alkaline equilibrium toward later times of day. In spring and fall there was a shift in acid-alkaline balance in the direction of metabolic acidosis, in winter--mixed acidosis. Full respiratory compensation was observed in all cases. The biorhythmic and seasonal changes in respiratory function and gas metabolism should be considered in transferring persons to unusual conditions of life and labor in order to prevent desynchronoses and pathologic changes of the organs of respiration and to prevent neuroses, possibly by administration of sedatives. References 9: 5 Russian, 4 Western.  
[490-6508]

UDC: 628.543:628.357

LOCAL PURIFICATION OF INDUSTRIAL WASTE WATER TO REMOVE HEAVY METAL IONS  
BY SULFATE-REDUCING MICROORGANISMS

Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR. SERIYA BIOLOGICHESKAYA  
in Russian No 6, Nov-Dec 82 pp 54-58

GLAZUNOV, V. D. and ILYALETDINOV, A. N., Institute of Microbiology and  
Virology, Kazakh SSR Academy of Sciences, Alma-Ata

[Abstract] A study was made of the kinetics of precipitation of heavy metal ions by biogenic hydrogen sulfide. According to the method suggested by the authors, sulfate-reducing microorganisms (*Desulfovibrio desulfuricans*) were cultivated in a container consisting of a semipermeable membrane immersed in the waste water to be purified. The membrane prevents the microorganisms from harmfully influencing the environment without preventing diffusion of hydrogen sulfide into the waste water. This creates a system for constant production of hydrogen sulfide, its liberation and precipitation of heavy metals in the form of insoluble sulfides. A figure illustrates the dynamics of precipitation of the Hg cation, its concentration dropping from 200 mg/l (as  $\text{HgSO}_4$ ) to 5 mg/l within one hour, virtually completely within 36 hours. Where the concentration of heavy metal ions in industrial wastes is 0.1 to 10.0 mg/l and the total contact surface of the semipermeable membrane is up to 10 square meters, the time of effective use of the membrane is limited only by the strength characteristics of the film. The method is simple to perform and reliable in operation and allows the installation to be included in any stage of the technological cycle of purification structures at an industrial enterprise. Figures 3; references 5 (Russian).  
[533-6508]

UDC 615.285.7.099+613.632.615.285.7

COMBINED TOXICOLOGIC AND HYGIENIC STUDY OF ORGANOPHOSPHORUS INSECTOACARICIDE ACTELLIC

Moscow GIGIYENA I SANITARIYA in Russian No 6, Jun 83  
(manuscript received 6 Jan 82) pp 32-35

KAGAN, Yu. S. VOYTENKO, G. A., PAN'SHINA, T. N., VORONINA, V. M., KOSHAREVA, N. V., RODIONOV, G. A., SASINOVICH, L. M., UNGVARI, D., KADAR, I., LEKHOTSKI, K., MOLNAR, Ye., PAKSHI, K., SEBERINI, Yu., SEBERINI, S. and TATRAY, E., All Union Scientific Research Institute of Hygiene and Toxicology of Pesticides, Polymers and Plastics, Kiev; State Institute of Labor Hygiene and Occupational Diseases, Ministry of Health, Hungarian Peoples Republic, Budapest

[Abstract] Results were reported of a collaborative study evaluating toxicologic and hygienic properties of a new insectoacaricide--actellic--pyrimiphosphomethyl-0,0-dimethyl-0-(-2-diethylamino-6-methylpyrimidyl-4)-thiophosphate. Actellic proved to be a nontoxic pesticide with weak cumulative effect via the inhalational or oral route of administration. Repeated administration of actellic led to a depression of cholinesterase activity and induction of monooxygenase enzyme system in liver microsomes. The effect on neuromuscular transmission and the rate of stimulus propagation along the peripheral nerves in rats was weak, and so was its sensitizing effect. The threshold level for its toxic effect via oral administration to white rats was 3.3 mg/kg; in 1 mg/kg doses actellic caused adaptive-type changes. By the inhalational route, the chronic effect threshold was determined to be 10 mg/m<sup>3</sup>. The maximum permissible levels were established as follows: for air in the working area: 2 mg/m<sup>3</sup>, and for water--0.01 mg/kg. References 14: 4 Russian, 10 Western.  
[715-7813]

CLINICAL AND PATHOGENETIC ANALYSIS AND CORRECTION OF BEHAVIORAL ABNORMALITIES  
OF TEENAGERS

Moscow ZHURNAL NEVROPATOLOGII I PSIKHIATRII IMENI S. S. KORSAKOVA in Russian  
Vol 82, No 10, Oct 82 (manuscript received 26 Nov 81) pp 1517-1523

SEMKE, V. Ya., AVDEYENKO, A. A., BABUSHKINA, L. U., BOKHAN, N. A.  
VAS'KOVA, G. A., NOKHRINA, L. Ya., RYBALKO, M. I. and SLAVSHCHIK, G. I.,  
Chair of Psychiatry, Altay Medical Institute imeni Lenin Comsomol, Barnaul

[Abstract] Pathogenetic principles of behavioral abnormalities were studied on 386 teenagers from special schools for juvenile delinquents and from a group registered with the Inspector of Minors' Affairs. A high percentage (54%) of psychological abnormalities was noted. Various characterologic problems were noted (incipient nucleic psychopathies) along with neurotic states (sleepwalking, nightmares, sleeptalking, etc.). About half of the cases studied exhibited social and pedagogic neglect; deviant behavior included theft, alcoholism, dope addiction, running away from home and pseudology. The most critical time for development of these problems was between the 7th and 12th years of age. About half of these delinquents came from broken up homes or from quarreling families with little or no supervision of children; most of these families were reasonably well off. Electroencephalographic examinations showed irregular alpha-rhythm. Treatment measures were developed on an individualistic basis. Only 12 of these subjects showed no improvement after treatment, and 18 actually worsened. References 29: 22 Russian, 7 Western.  
[359-7813]

EVOKED POTENTIALS OF POSTERIOR ASSOCIATIVE CORTICAL AREAS IN DIFFERENTIATION AND RECOGNITION OF HUMAN FACE IMAGES

Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 9, No 2, Mar-Apr 83  
(manuscript received 8 Dec 81) pp 187-194

ZELENKOVA, T. P., deceased, Institute of General and Forensic Psychiatry  
imeni V. P. Serbskiy, Moscow

[Abstract] Subjects of this study were 18 healthy individuals 23 to 35 years of age. They were held in a darkened and shielded room, seated in comfortable positions. A screen was placed 105 to 110 cm before their eyes, on which black and white slides were projected for periods of 15 ms, slightly longer than the recognition threshold. The stimulus field measured 30 x 38 cm. The stimulus was presented binocularly with an arbitrary repetition time interval of 5 to 10 seconds in random order. Electric activity was measured from the posterior associative areas of the left and right hemispheres. Analysis of the amplitude parameters of evoked potentials in the differentiation and recognition of human face images in three experimental situations was performed. In the first two series, coarse differentiation of stimuli was performed on the basis of a single characteristic--presence or absence of the general contour of the face on a diffusely illuminated stimulus field. In the last series, fine differentiation of the actual images of different faces was performed based on differentiation of small details which differentiated the images from the other two used. It was concluded that in differentiating a random sequence of diffusely eliminated stimulus fields and three human face images differing in slight details of the image of eye and mouth, the basic differences in evoked potentials in posterior associative areas of the cerebral cortex were related to the most expressed positive component  $P_{180}$ , the amplitude of which depended on the nature of the primary task of perception. The highest amplitudes of  $N_{140}$  and  $P_{180}$  waves in the right hemisphere and  $P_{300}, N_{350}$  waves in the left hemisphere were evoked by different images, indicating a definite sequence of information processing in the right and left hemispheres during fine differentiation of images. The results obtained indicate reflection in the amplitude parameters of evoked potentials of functional restructuring of interhemisphere relationships, supporting recognition and selection of visual images. Figures 4; references 10: 8 Russian, 2 Western.  
[490-6508]



## MECHANISM OF DETERMINING PITCH OF SOUND SOURCES

Moscow VOPROSY PSIKHOLOGII in Russian No 2, Mar-Apr 83  
(manuscript received 30 Jun 82) pp 118-124

ZAL'TSMAN, A. M.

[Abstract] A report is presented on studies in which persons with untrained ears were trained to reproduce the pitch of artificially-produced sounds which mimicked the vowels "e" and "u" (long sounds). It was found that when test subjects attempted to compare synthesized sounds as to pitch of the base tone, an ability learned previously to differentiate sounds as to pitch for pure tones was not adequate to a new task, which required a new ability--that of abstracting the base tone from a complex sound. The experimental task of the present work was to test whether, based on the effect of decreasing loudness of a nonfixed sound, it is possible to formulate the ability to abstract the base tone of a musical sound and thereby achieve precise differentiation of sounds of different timbres as to pitch of the base tone. The results of the experiment showed that perceptive abstraction of the base tone of a musical sound is a necessary component part of the process of differentiating sounds with different timbres in terms of base tone pitch and that the mechanism of this abstraction is the effect of decreasing loudness of a nonfixed sound. References 12 (Russian).  
[529-6508]

## STUDY OF PHENOMENON OF ACTIVATION OF IMAGING ACTIVITY IN HYPNOSIS

Moscow VOPROSY PSIKHOLOGII in Russian No 2, Mar-Apr 83  
(manuscript received 13 May 82) pp 124-125

TEMPER, Yu. B.

[Abstract] A skeletal muscle was used as a model of a peripheral organ. A method of activation of artistic creativity in hypnosis described earlier was used, supplemented by recording of the bioelectric activity of the right-hand-finger extensor muscles. The subjects were told to draw pictures of nature or abstract concepts, then placed in hypnotic sleep, during which it was suggested to them that they were excellent artists with a clear image in their minds of the content of their pictures. After this suggestion, the subjects then drew the same picture and described their sensations. Fifty experiments were performed on 10 practically healthy test subjects 18 to 19 years of age. The effect of hypnotic suggestion of artistic skill was manifested in that after the suggestion the subjects overcame their inability to begin drawing, and an improvement was seen in the quality of their pictures. The subjects reported that they imagined the content of their pictures more clearly and in greater detail, and felt a greater desire to draw. This state was maintained after wakening. The effect was accompanied by a clear increase in rest tonus of the right-hand-finger extensors. The data confirmed the fact that hypnotic suggestion can improve artistic abilities. References 11 (Russian).  
[529-6508]

## PRESENT STATUS OF SYSTEMS GENESIS THEORY

Moscow ZHURNAL NEVROPATOLOGII I PSIKHIATRII IMENI S. S. KORSAKOVA in Russian  
Vol 82, No 10, Oct 82 (manuscript received 17 Mar 82) pp 1446-1453

SUDAKOV, K. V. and KOKINA, N. N., Institute of Normal Physiology imeni  
P. K. Anokhin, USSR Academy of Medical Sciences, Moscow

[Abstract] P. K. Anokhin's theory of systems genesis (as a part of a general theory of functional systems) was developed in the 1933-38 time frame and consisted of three principles: selective development of individual functional systems and their components, consolidation of elements formed in embryogenesis and minimal provision of functions. In its original concept it covered primarily prenatal and early postnatal periods. This paper reports an attempt made to extend this theory to the entire dynamics of the formation and destruction of functional systems through the entire life cycle of an individual. In prenatal embryogenesis, a cellular basis of functional systems predominates until final functional adaptations are reached. In the prenatal systems genesis, internal selfregulatory mechanisms are formed. Recent studies have begun to point out postnatal systems genesis: nutritional, behavioral, sexual, etc. Systems genesis of behavioral acts extends the theory from individual to a population base. It points out the heterogeneity of children in their peer groups, and their individualistic maturation, which is of great social importance. These concepts are now being applied in pediatric neurology and surgery. Figures 3; references 32 (Russian). [359-7813]

## VARIABILITY OF HUMAN NEURODYNAMIC AND PSYCHODYNAMIC FEATURES

Moscow PSIKHOLOGICHESKIY ZHURNAL in Russian Vol 4, No 1, Jan-Feb 83  
(manuscript received 15 Dec 80) pp 30-37

DUBININ, N. P. and BULAYEVA, K. B.

[Abstract] Studies of the genetics of normal mental function have traditionally used twins or genealogically-determined populations. The authors have studied a population of 203 students of 8 classes of Moscow schools along with 52 mothers and 27 fathers. This population has been historically diversified with respect to genetic and social structure. The students included 99 females and 104 males. Neurodynamic functions examined were strength and lability in relation to light and sound intensities or frequencies. Reaction times and strength of reaction were recorded. Psychodynamic features of rate and accuracy of performing a non-verbal "pure culture" IQ test and rate of solving the combination problems of the Marburg game" formed the second component of the study. Subjects were not informed of the insolubility of some problems of the Marburg game. Reactions to variety and novelty were also

recorded. Variations of tasks were studied and a partially descriptive "variation coefficient" developed. Results showed a sexual dimorphism that the authors attributed to differing maturation of boys and girls, and a generational difference in neurodynamic performance, with parents who showed "normal" reactions and children with extreme values in these parameters. The results indicate that the genetic and social background of the subjects are involved in neuro- and psychodynamic parameters. They are also specific for a given population, in this case, from the city of Moscow, and subjects from other locations could be expected to react differently to the given stimuli. References 19 (Russian).

[550-12131]

#### CONFLICTS AND THEIR RESOLUTION IN LABOR COLLECTIVES

Moscow PSIKHOLOGICHESKIY ZHURNAL in Russian Vol 4, No 3, May-Jun 83  
pp 51-60 (manuscript received 15 Mar 82)

BOYKO, V. V. and KOVALEV, A. G.

[Abstract] The nature of conflicts in working relationships in a socialist society are analyzed and categorized. The authors look at conflicts from aspects of inter-personal and group relationships, motives and functions and dynamics of conflict emergence, course and resolution. Disputes over operational procedures, personal conflicts, and monetary considerations are discussed. Finally, conflict resolution is discussed from various angles. These include consideration of the essence and content of the conflict as well as the immediate cause of dispute, the objectives that are at odds in a conflict, cognitive and emotional aspects and individual differences between adversaries, effects of technical and production shortcomings in provoking disputes, internal dynamics of conflicts, likely outcome as a factor in resolving conflicts and ethical considerations in conflicts. In resolving a labor conflict, the authors stress, a director must properly select approaches that will consider all factors involved in terms of status, process and results. They note that their theoretical presentation should be followed by empirical verification of many of these elements of a labor conflict. References 26:

24 Russian, 2 Western.

[549-12131]

## PSYCHOLOGICAL CONSULTATION IN MARITAL CONFLICTS

Moscow PSIKHOLOGICHESKIY ZHURNAL in Russian Vol 4, No 3, May-Jun 83 pp 70-72

NAVAYTIS, G. A.

[Abstract] It is pointed out that strengthening of the family is one of the most important tasks in the USSR. The author reports on attempts at resolving marital disputes among couples instituting divorce proceedings in Vilnius, Lithuania. Such consultation has been offered at the Vilnius Civil Registration Office [ZAGS] since 1979. Data indicate that nearly 35% of marriages in Vilnius end in divorce; of these some 76% affect couples under 25; 37% have been married less than 4 years. The Vilnius consultants attempt to reconcile couples whose estrangement is based in irrational perceptions through diagnosis of true causes of conflict; they attempt reconstruction of conjugal relationships. The methods used by consultants in calming hostilities and putting estranged couples at ease during consultations are stressed. The author notes that his remarks are of a preliminary nature and may be useful in formulating empirical studies. References 6 (Russian).

[549-12131]

## MODERN CHILDREN'S FOLKLORE AS THE SUBJECT OF INTERDISCIPLINARY RESEARCH [CHILDHOOD ETHNOGRAPHY]

Moscow SOVETSKAYA ETNOGRAFIYA in Russian No 3, May-Jun 83 pp 34-45

OSORINA, M. V.

[Abstract] The author reviews Soviet and Western studies of children's folklore and its relation to the adult world since the 1920s. The need to study children as meaningful social groups with their own merits, as well as individuals, is stressed. Definition of terms poses special problems. The author distinguishes between folklore provided to children by adults, and that perpetuated and shared by children themselves. Teasing, off-color and coarse genres have often received condemnation instead of deserved study, since adults discourage them. Categories of adult-to-child folklore for calming, encouraging, teaching and entertaining the latter are noted, and the metafunction of folklore in bringing the child into his culture is pointed out. A special category of interest is that of folklore in modern urban society. Folklore is regarded to offer common ground to the child as he becomes integrated with his peers in kindergarten or school. Changes in folklore genres and their "delivery" occur as the child matures, so that, for example, teasing becomes improper by 10-11 years of age. The telling of secret "terrible" tales and knowledge of "hideouts" are devices offering individuals special status among their peers. Along with chronological factors, territorial aspects of folklore also require study. Children in specially restricted territories (hospital wards or summer camps, etc.) offer

an unusual opportunity for sharing folklore information. Despite the rapidness of change in modern society, folk genres have been found to be durable; those of children must be studied as full-fledged elements of the overall culture. Footnotes 30: 16 Russian, 14 Western.  
[561-12131]

#### HELP OF PSYCHOLOGISTS IS NEEDED

Moscow SOVETSKAYA ETNOGRAFIYA in Russian No 3, May-Jun 83 pp 75-78

KON, I. S.

[Abstract] The author reacts to an article by A. F. Dashdamirov by noting that ethnopsychological studies have not moved forward as rapidly as might be hoped due to methodological difficulties. Key among these is the approach arguing various points such as national character and psychology, ethnic self-awareness, etc., without first asking fundamental questions and posing hypotheses about the existence of such distinguishing features. Descriptions must be followed by explanations of phenomena, and some determination must be made as to whether such manifestations are actually distinctive features of a people, or simply current psychological states that can be found in many peoples. Sociocultural, and psychological, methods have not yet been coordinated so that a meaningful interdisciplinary approach can be developed. The historico-cultural approach must be combined with experimental methodology so that the contributions of both will be realized. The cross-cultural methods of L. S. Vygotskiy and A. R. Luria have not been fully utilized. Psychologists must participate in ethnographic research as they did, for example, in the Caucasus gerontological group. The limitations of the questionnaire approach and the positive and negative features of first-person input must be weighed in evaluating results. Longitudinal studies of populations must supplement comparative age-group studies. The psychologist must take a place next to the sociologist in promoting ethnography.

[561-12131]

UDC: 362.172+362.7]:614.2

TASKS FOR PUBLIC HEALTH AND MEDICAL SCIENCE TO IMPROVE WOMAN AND CHILD CARE  
IN THE LIGHT OF THE DECISIONS OF THE TWENTY-SIXTH CPSU CONGRESS

Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR in Russian No 11, Nov 82  
(manuscript received 17 Jun 82) pp 3-11

[Article\* by S. P. Burenkov]

[Text] One of the vivid aspects of activity of the CPSU, evidence of genuine humanism of the Soviet state and social regime, is the constant concern about mother and child health. At all stages of development of the Soviet system of health care, refinement of the system of mother and child care was one of its main tasks. This was reflected with new force in the decisions of the 26th CPSU Congress, November (1981) Plenum of the CPSU Central Committee, decrees of the CPSU Central Committee and USSR Council of Ministers "On Steps to Strengthen State Assistance to Families With Children."

The foundation of the most valuable social asset--public health--is laid expressly in childhood. This is why problems of mother and child care are being discussed at this session.

The 46th Session of the USSR Academy of Medical Sciences is convening on the anniversary of a noteworthy date--60th anniversary of formation of the Union of Soviet Socialist Republics--in an atmosphere of nationwide upsurge of political and labor activity. In keeping with the decree of the CPSU Central Committee and USSR Council of Ministers No 870, dated 23 September 1977, "Steps for Further Improvement of Public Health Care," the closest attention is being given to matters of woman and child health care by soviet and Party agencies, ministries, departments and public organizations.

In the years of the 10th Five-Year Plan, there was considerable reinforcement of the material and technical base of obstetrical-gynecological and pediatric therapeutic and preventive institutions. There has been expansion of the network of children's polyclinics, hospitals, women's consultation centers and maternity homes. They have been better furnished with diagnostic and therapeutic equipment. Large, general [multispecialty] children's hospitals have been started up. There are children's polyclinics under construction with

\*Report delivered at 46th Session of the General Meeting of the USSR Academy of Medical Sciences, dedicated to current problems of mother and child care, 16-19 February 1982, Moscow.

swimming pools, gyms and departments of rehabilitation therapy. The norms have been raised for outlay of monetary funds for food and drugs in maternity homes and children's hospitals. Commercial output of children's food items has increased. Under the 10th Five-Year Plan there was considerable expansion of training of pediatricians. Six additional pediatric faculties were organized. Enrollment in medical VUZ's in the "pediatrics" specialty has increased by more than 2000 students. At the present time, there are 103,000 pediatricians and 53,000 obstetrician-gynecologists working in the public health system. Organizational forms of pediatric and obstetric-gynecological care are being improved. Pediatric districts are continuing to be subdivided into smaller units; the average number of children per district pediatrician has dropped to 870, which has made it possible to improve dispensary supervision, preventive, therapeutic and health-improving work with children.

Much is being done to improve the health of working women. A laboratory of women's industrial hygiene was opened at the Institute of Industrial Hygiene and Occupational Diseases, USSR Academy of Medical Sciences. Together with other ministries and agencies, the USSR Ministry of Health has approved recommendations on employment of pregnant women in 11 sectors of industry (light, textile, furniture, fish and others), on the basis of developed hygienic standards. The USSR State Committee for Labor and Social Problems, USSR Ministry of Health and AUCCTU have approved of a list of industries, occupations and jobs involving difficult and deleterious conditions, where women are not allowed to work.

Special attention is being given to combined solution of the problem of protecting the fetus and neonate. A network of medicogenetic consultation centers, "Marriage and Family" consultation centers, is being developed. Three All-Union centers were opened: for medicogenetic consultations, which is based at the Institute of Medical Genetics, USSR Academy of Medical Sciences; for detection of congenital pathology in children, based at the Moscow Institute of Pediatrics and Children's Surgery, RSFSR Ministry of Health; for prenatal diagnostics, which is part of the All-Union Scientific Research Center for Mother and Child Health Care. The All-Union Center for Neonate Resuscitation was organized under the Pediatric Surgery Clinic of the Second Moscow Medical Institute, and the All-Union Center for Surgery of Congenital Heart Defects in Neonates and Infants up to 1 Year Old was opened at the Institute of Cardiovascular Surgery, USSR Academy of Medical Sciences. The nation's first departments of resuscitation and intensive care for premature babies have been opened at Moscow Clinical Hospitals No 10 and No 13. A total of 430 departments and hospitals have been deployed for specialized care of neonates and premature babies.

There is continuing development of specialized medical care for women and children. Obstetric hospitals have been opened for pregnant women with diverse pathology; office hours have been reserved at women's consultation centers for women whose pregnancies are interrupted, those suffering from endocrine diseases and sterility.

Development of specialized child care is proceeding along the line of broad organization of republic (oblast) centers and departments of pulmonology,

cardiorheumatology, allergology, hematology, endocrinology, resuscitation and intensive care, which make it possible to help children with diverse pathology on a modern level.

Implementation in our country of major socioeconomic transformations and medical measures has made it possible to significantly improve the health status of the child and woman population. There has been improvement of physical development of children in all age groups in all parts of the country. In the years of the 10th Five-Year Plan, infant, perinatal and maternal mortality dropped by 11, 12.2 and 7.7%, respectively; gynecological morbidity involving temporary disability has diminished both in number of cases (by 15%) and days (by 13%). Mortality associated with pneumonia, hemolytic disease, birth trauma and asphyxia has dropped. Some advances have been made in lowering child morbidity referable to acute droplet and intestinal infections. There is a trend toward decline of morbidity rate among children reared in preschool institutions.

The positive changes in woman and child health care are attributable, to a significant extent, to development of medical science and introduction of its advances to practice. Studies of the most pressing problems of pediatrics and obstetrics in our country are being pursued at 26 scientific research institutes of pediatrics, mother and child care, obstetrics and gynecology, as well as 525 relevant departments of medical institutes and institutes for advanced training of physicians. A total of 392 doctors of medical sciences and 2247 candidates of medical sciences are involved in this work. More than 1400 works [studies] are completed annually dealing with pediatrics, obstetrics and gynecology.

Scientific councils have been organized under the Presidium of the USSR Academy of Medical Sciences for pediatrics, obstetrics and gynecology, as well as problem commissions that plan and coordinate the research work at scientific research institutes and departments of the relevant specialties.

In December 1980, the USSR State Committee for Science and Technology, USSR Gosplan and USSR Academy of Sciences approved a State program of scientific research, which provides for development of effective methods for prevention and treatment of mother and child diseases in 1981-1985.

In accordance with the decree of the CPSU Central Committee and USSR Council of Ministers, "On Steps for Further Improvement of Public Health Care," the All-Union Research Center for Mother and Child Health Care was organized in 1979 under the USSR Ministry of Health. It is called upon to serve as the head institution in our country for the problem of "Scientific Bases of Woman, Mother and Neonate Health Care," to coordinate the State program of research in the fields of obstetrics and gynecology, to develop the fundamentals of perinatology, physiology and pathology of pregnancy, to work on the training of scientific personnel and render assistance to practical health care in Union republics. The Ukrainian Republic Center for Mother and Child Care is studying problems of neonatology, physiology and pathology of infants, as well as female reproductive function. An analogous center has been established in Moldavian SSR. Three new scientific research institutes of mother and child care have been opened: in Turkmen and Tajik SSR and in RSFSR (Ivanovo), as well as two new scientific research institutes of obstetrics



and gynecology--in Kazakh and Uzbek SSR. Groups of scientists in Moscow, Leningrad, Kiev, Rostov-on-Don and several other cities are making a major contribution to the study of problems of obstetric-gynecological care.

The All-Union Center for Mother and Child Care, Institute of Medical Genetics of the USSR Academy of Medical Sciences, Moscow Scientific Research Institute of Pediatrics and Child Surgery, RSFSR Ministry of Health, and a number of other scientific institutions have developed and are introducing to practice methods of examining pregnant women and neonates for detection of hereditary diseases, as well as fundamentals of ultrasonic diagnosis of perinatal pathology, monitoring of condition of fetus, methods of treatment of acute and chronic hypoxia of the fetus and neonate, in particular, craniocerebral hypothermia, hyperbaric oxygenation. New methods, based on in-depth studies of neurohumoral, immunological and biochemical mechanisms, are being introduced to practice for detection and treatment of various forms of female sterility, neuroendocrine diseases and syndromes.

In view of employment of women in different sectors of the national economy, there has been expansion in recent years of studies dealing with the effects of industrial factors on the health of the mother, fetus and neonate. The Leningrad Institute of Obstetrics and Gynecology, USSR Academy of Medical Sciences, Sverdlovsk Institute of Mother and Child Care, Institute of Industrial Hygiene and Occupational Diseases, USSR Academy of Medical Sciences, and others are working with success in this field.

A significant place is occupied by investigation of problems of age-related physiology, morphology, biochemistry and hygiene, which made it possible to validate schedules of schooling, work, recreation, to elaborate the principles for improving the health of children in different age groups, create a system of medical supervision of children engaged in physical culture and sports. Studies are in progress of child adaptation to rearing conditions in child groups. The Institute of Child and Adolescent Hygiene, USSR Ministry of Health, Institute of Pediatrics, USSR Academy of Medical Sciences, Central Institute for Advanced Training of Physicians and others are actively involved in solving these problems. Important research is being pursued at the Institute of Medical Problems of the North, Siberian Department of the USSR Academy of Medical Sciences, in the area of physiology, development and functional state of mother and child under the extreme conditions of the Extreme North, Siberia and Far East. The Institute of Nutrition, USSR Academy of Medical Sciences, its Kazakh affiliate, scientists in Ukrainian and Kirghiz SSR have developed new, adapted milk formulas for infants, of an improved composition, that is closest to that of mother's milk.

Studies in pulmonology have defined several questions of pathogenesis, morphology, prevention, diagnosis and treatment of bronchopulmonary diseases in children. Development of effective programs of intensive care for serious forms of pneumonia and acute respiratory diseases in infants has lowered mortality among infants up to 12 months old. Principles of optimum therapy of a number of infectious diseases are being adopted in practice; their laboratory diagnosis has been improved; the schedule for preventive inoculations is being upgraded; methods of sparing immunization have been developed; work is continuing to improve existing vaccines and develop new ones. The advances

made in child surgery are largely related to development of the anesthesiology and resuscitation service in pediatrics and establishment of the neonate surgery service. As a result of introduction of new diagnostic and therapeutic methods, postoperative mortality associated with intestinal obstruction, acute appendicitis, strangulated hernia, fractures and poisoning has declined. The Institute of Pediatrics, USSR Academy of Medical Sciences, which is performing much work on the training of scientific and clinical personnel for Union republics, is the head institution that plans and coordinates scientific research in the field of pediatrics.

Along with the scientific achievements in the area of mother and child care, there are still quite a few unsolved problems. Further development of the most important principle of Soviet health care, its general line--prevention--must become the principal content of the work of medical scientists and health care workers, and primarily all those who are solving problems of mother and child care. Strengthening health and lowering morbidity among women, intensification of preventive work on development and rearing of a healthy child, upgrading medical care for women and children, further lowering of child morbidity and mortality--these are the basic problems that require solutions under the current five-year plan.

However, development of methods of prevention, including primary prophylaxis, which can have a cardinal effect on factors affecting mother and child health, is not active enough. We know that a child's health is directly related to the mother's health status, effects on a woman of environmental factors, working conditions, particularly during pregnancy. The Institute of Industrial Hygiene and Occupational Diseases, USSR Academy of Medical Sciences, and other institutes concerned with hygiene should accelerate elaboration of recommendations on work and rest schedules and standards for women; together with the Leningrad Institute of Obstetrics and Gynecology, USSR Academy of Medical Sciences, Sverdlovsk Institute of Mother and Infant Care, it is imperative to expand the study of the effects of industrial factors on onset of pathological states and diseases of mother and fetus, as well as to develop scientifically validated recommendations on improving the health of pregnant women. The All-Union Scientific Research Center for Mother and Child Care, together with other institutes, should expedite the solution of these problems, as well as expand studies aimed at demonstration of systemic correlations between mother and fetus, problems of perinatal protection of the fetus.

It is imperative to actively develop basic research dealing with problems of women incapable of full-term pregnancy. This is being worked on by many institutes and departments, including the All-Union Center for Mother and Child Care, Leningrad Institute of Obstetrics and Gynecology, USSR Academy of Medical Sciences, Sverdlovsk Institute of Mother and Infant Care, Lvov, Uzbek, Kazakh and Georgian institutes of obstetrics and gynecology.

Sterility is a serious problem. At the present time, about 15% of married couples are unable to have children. There is a need for complex scientific work on methods of diagnosing and stage-by-stage treatment of various forms of female and male sterility.

Proper family planning plays a considerable role in preserving a woman's reproductive function. An interrupted pregnancy has an adverse effect on the

woman's health and her child-bearing function. Many institutes and departments of obstetrics and gynecology are engaged in studies of the problem of contraception. However, no clearcut recommendations exist in this area as yet.

In a number of instances, the experience of public health practice is ahead of theory. Thus, the experience in Moscow revealed that keeping the neonate with its mother in the maternity home lowers significantly morbidity of the women and infants. At the present time, we are faced with the task of designing and building maternity homes with a basically new lay-out, and of remodeling old ones. We need validated recommendations on the planning and construction of maternity homes with the basically new lay-out. In many cities of our country, early discharge of neonates from maternity homes is practiced, but scientific methodological recommendations have not yet been elaborated for supervising and caring for the newborn infant.

Further improvement of child care in the light of the decisions of the 26th CPSU Congress should be based on comprehensive development of preventive care of healthy children, providing the necessary conditions for their proper development and rearing. Children's ambulatory polyclinic institutions are the central element in this work. However, they do not yet always devote proper attention to preventive work with healthy children. Some physicians are not sufficiently acquainted with problems of physiology of children in different age groups, make mistakes in organizing nursing and diet, physical education, conditioning children, particularly infants, and they supervise children in a formal way. Public health agencies and scientific institutions must eliminate the existing flaws as soon as possible and complete work on organizing the work schedule at children's polyclinics, introduction to practice of tested, effective methods and the optimum forms of dispensary care of the child population, converting children's polyclinics into genuine centers for the protection of children's health.

Much should be done in the area of improving hygienic education of the public, eradicating harmful habits of parents, active propaganda on rearing and development of healthy children. There is a pressing need to expand research on prevention of child morbidity. At the present time, when the overall cultural sophistication of the public has increased significantly, there are high requirements for hygienic education of the public. The All-Union Institute of Social Hygiene and Public Health Organization imeni N. A. Semashko and Central Institute of Health [Sanitary] Education should participate very actively in solving this important problem, intensify research on improvement of health education, develop forms and methods of working with parents to provide a healthy environment in the family, instill an organic need for physical culture and adherence to hygienic habits.

There are still quite a few unsolved problems in the area of optimum diet for children, as one of the most important tasks in conjunction with all of the preventive measures aimed at lowering child morbidity and mortality. The problem of breast feeding requires special attention. In our country, the indicator of breast feeding is high, in comparison to other developed nations; however, there has been a tendency toward its decline in recent years. Unfortunately, not all of our scientist-pediatricians have taken an active position on this score. Problems of controlling hypogalactia and publicizing breast feeding are still not being worked on sufficiently. Active,

scientifically validated explanatory work is required of scientists and practicing physicians with the public. Investigation of the requirements of children in different age groups, with respect to the main nutrients, validation of differentiated dietary norms for children in accordance with climate and geographic conditions, physical and mental work, typological distinctions of higher nervous activity and health status constitute an important task. Development of new milk mixtures enriched with protective factors (lysozyme, bifidum bacteria, bifidogenic factors, etc.) is a promising direction in the area of improving nutrition for infants up to 12 months old.

It is imperative to intensify scientific research in the area of child physiology, patterns of physical and psychoemotional development, since some of the recommendations in this field reflect conceptions of prior decades. There must be accelerated development of new principles of optimum exercise for children, new conditioning methods, better defined hygienic standards for schooling and rearing conditions, improvement of immunoprophylaxis methods.

The 26th CPSU Congress has formulated the responsible task of improving the quality and efficacy of dispensary care of the public, particularly children. Implementation of mass scale preventive examinations requires new organizational forms of work, introduction to practice of available, easy screening tests for detection of deviations of health status and early diagnosis of diseases, as well as predisposition factors. Special attention should be given to questions of prevention and improved dispensary care of children in preschool institutions, lowering morbidity and children groups. We need concrete recommendations on optimum regimens of adaptation in preschool institutions, differentiated methods for improving health and conditioning. New forms of organizing mass-scale prevention and treatment of myopia, dental caries, development of effective methods of reconstructive treatment of children, in both hospitals and on an ambulatory basis, are needed.

We cannot be satisfied with the rate of decline of child mortality. Additional measures are needed to further lower mortality in hospitals among neonates up to 24 h old, to eliminate flaws in the work of the ambulatory polyclinic level, emergency medicine, children's hospitals and departments. It is imperative to improve diagnosis of diseases, particularly in infants, to assure prompt hospitalization and qualified medical care in emergency cases. Problems of prenatal protection of the fetus, growth and development of a healthy infant in the first year of life, optimum nutrition, prevention and treatment of perinatal pathology, bronchopulmonary, infectious and allergic diseases, as well as in-depth investigation of medicosocial aspects that determine the health status of infants up to 12 months old, play an important part in the integrated solution of the problem of further decline of child mortality. Higher demands should be made in this direction of scientific research institutes of republics where child mortality is higher. In-depth analysis of its causes and structure should determine the direction of research and work of public health agencies and institutions. Having a powerful scientific potential, we have every ground to achieve better results in the matter of improving child health, lowering morbidity and mortality. However, investigation of socio-hygienic causes of child mortality has not yet made it possible to elaborate models of an optimum, integrated system of infant care at up to 12 months of age.

In the immediate future, public health agencies, institutes and departments will have to provide for extensive introduction to practice of effective methods of treatment and care of neonates, which are used with success in the leading centers of our country. The institutes of mother and child care, of pediatrics, of obstetrics and gynecology must intensify the study of problems of diagnosis and treatment of perinatal brain lesions, infectious-inflammatory diseases, congenital and hereditary pathology. The problem of resuscitation of neonates and premature babies requires serious scientific validation. Lowering child morbidity referable to respiratory diseases, development of more refined and effective methods of preventing acute respiratory diseases, particularly in organized groups of children remain as the most important tasks, since they make up the largest share of child pathology. It is known that, as a rule, epidemic outbreaks of influenza strike primarily the child population. At the present time, several institutes have developed influenza vaccines for children. However, they are still not being used. It is imperative to conduct a comparative assessment of these vaccines without delay, to solve problems related to industrial production of the most effective and technologically efficient samples. Not enough attention is still being devoted to acute pneumonia in infants from the standpoint of prevention and intensive therapy.

There are still some pressing problems of specific prevention, early detection of discrete and atypically occurring forms and intensive therapy of some infectious diseases.

Further development and refinement of surgical care of children, including neonates, children with cardiovascular defects, disturbances referable to the skeletomuscular system, work on sparing methods of surgical management of chronic and acute diseases, introduction to practice of new surgical management methods are of enormous practical importance.

The quality of emergency medical care will have to be significantly improved under the 11th Five-Year Plan. Pediatric emergency brigades should be organized in all cities, and specialized ones, for neonates, resuscitation, etc., in the large cities. Elaboration of effective methods of resuscitation and intensive therapy at both the prehospital stage and in hospitals should, unquestionably, be instrumental in further decline of mortality within the first 24 h. Unfortunately, the necessary attention is not being given to this problem.

It is a pressing matter to conduct an integrated study of the patterns of formation in children of chronic pathology, especially diseases that lead to early disability and inability to work in the future. Specialized institutes must intensify work on preventive principles, upgrade diagnostic criteria, methods of stage-by-stage treatment and rehabilitation of children with diseases of respiratory and digestive organs, kidneys, endocrine system and cardiovascular pathology.

Special attention should be given to upgrading organization of therapeutic and preventive care of children in rural areas. Work must be intensified to find more effective forms of preventive work on the level of the primary elements of rural medicine--feldsher-midwife centers, rural outpatient centers, uchastok hospitals.

Optimization of drug therapy is a serious problem. One should expand research on age-related pharmacology and pharmacokinetics, develop special drugs for children, specific action immune agents, blood substitutes and products for parenteral feeding.

There should be further development of future research on creation of new instruments, apparatus and equipment for obstetric-gynecological and children's therapeutic and preventive institutions, such as ultrasonic equipment, monitors of maternal, fetal and neonate status, modern anesthesia and respiration apparatus, amnioscopes with thin fiberoptics, endotracheal tubes for neonates, perfusion machines for measured instillation of liquids, etc.

In accordance with the decree of the CPSU Central Committee, USSR Council of Ministers and AUCCTU, "On Steps for Further Improvement of Sanatorium and Resort Therapy and Recreation for Workers and Development of a Network of Trade-Union Health Resorts," the USSR Academy of Medical Sciences must implement a broad program of scientific research in balneology and physiotherapy. In this area, proper attention should be given to improving methods of sanatorium and resort therapy of women and children.

In his report to the 26th CPSU Congress, Comrade L. I. Brezhnev, general secretary of the CPSU Central Committee and Chairman of the Presidium of the USSR Supreme Soviet, emphasized: "The Party of communists proceeds from the fact that it is simply inconceivable to build a new society without science." It should be the duty of each scientist to participate actively in solving problems of practical public health, in publicizing a healthy life style, in rendering direct care to the public at polyclinics and hospitals. It was also stressed from the rostrum of that congress that it is necessary to improve organization of the entire system of scientific research. "This system," said comrade L. I. Brezhnev, "must be considerably more flexible and mobile, intolerant of unproductive laboratories and institutes." At the same time, at a number of scientific institutions, the relevance and effectiveness of research are still inadequate. Scientific work is not always planned with due consideration of pressing practical problems. For example, in the republics of Central Asia, Kazakh and Azerbaijan SSR, where there is a large share of families with many children, there is inadequate planning of scientific topics pertaining to problems of prevention, distinctions of working with children and women in high risk groups, problems of nutrition, prevention of hypotrophy and anemia. There are some flaws in such work at the Turkmen Institute of Mother and Child Care, Institute of Human Reproductive Function imeni I. F. Zhordaniy, Georgian Ministry of Health. There is still poor supervision of performance of scientific institutions by the head institutes, scientific councils and problem commissions. Some institutions are conducting studies that hold little promise and do not make use of reserve personnel to complete scientific projects. At the present time, scientific research institutes and departments, along with public health agencies, are responsible for the quality of medical care and health status of children and women. The scientists' task consists not only of fulfilling plans for scientific research, but rendering regular assistance to clinical institutions, as direct participants in their work. By far not all of the highly qualified specialists participate actively in consultant and therapeutic work at children's hospitals, maternity homes, children's polyclinics and women's consultation

centers. In a number of cases, such work is formal in nature--there are no definite schedules for consultants at polyclinics, fixed days of professorial rounds and consultations at hospitals. We know of cases where therapeutic and preventive work is not set up any better than in ordinary hospital institutions in facilities that are clinical bases.

At the present stage, it is important to the national economy to make real use of scientific advances in public health practice. However, some institutes and departments are not active enough in this area, they do not study the efficacy of using new ways and means of prevention, diagnosis and treatment. At several medical institutions, practical use is not being made of effective methods, which have earned a place for themselves, for treating infants with pneumonia, prevention of caries, myopia, disturbances of the skeleto-muscular system, early detection of genetically caused hereditary diseases, etc. Ministries and local health agencies should organize work on introduction in such a way as to have all of the advances of modern science become the heritage of every medical institution. Scientists on medical councils of ministries of Union republics should play an important role in solving this problem. The chief institutes dealing with problems--All-Union Scientific Research Center for Mother and Child Care and Institute of Pediatrics, USSR Academy of Medical Sciences--must elaborate as quickly as possible the criteria of effectiveness of adopting scientific advances in clinical work.

To resolve the problems in the area of mother and child care, it is necessary for the entire system of advanced training of physicians and paramedical personnel, as well as their ideological-political and professional level, to undergo constant improvement. This task should always be in the center of attention of public health agencies, professors and instructors at institutes for advanced training of physicians, departments for advanced training at medical institutes, as well as scientists at institutes.

Under the 11th Five-Year Plan, the effectiveness of utilizing the potential of medical science must be increased drastically. Much work will have to be done to put in order the network of scientific research institutions, their structure, and to define the main scientific directions. It is imperative to broaden integration in working on the main problems of pediatrics, obstetrics and gynecology. The joint efforts of scientists and public health workers must be directed toward further strengthening of health and lowering morbidity and mortality.

The Presidium of the USSR Academy of Medical Sciences and Scientific Medical Council of the USSR Ministry of Health must intensify supervision and provide for successful implementation of the State program for mother and child care in 1981-1985, and place greater responsibility on institute administrators who fulfill the program.

There is still very much to be done, and success will depend primarily on creative activity and initiative of scientific workers, responsibility of every executor, every employee, for the job given to them. In forming the scientific plans for institutes and departments, it is important to define problems of first and foremost significance to public health practice. The effective strength of Soviet medical science lies expressly in its inseparable link with practice. An army of Soviet physicians and paramedical personnel,

almost 4 million people strong, is improving, at the Party's call, all levels of the health service, so that each Soviet person can always receive prompt, qualified and sensitive medical care.

Soviet public health will have to advance to new frontiers under the 11th Five-Year Plan. The lofty duty of medical scientists and all medical workers is to multiply their contribution to fulfillment of the program of social development of our nation approved by the 26th CPSU Congress, to improve the quality of medical and drug care of the public.

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## PRESSING PROBLEMS OF INFANT NUTRITION

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[Text] According to data of the WHO, two-thirds of the child population of our planet is undernourished. Various nutritional disorders are the direct or indirect cause of over half the deaths in this population. The consequences of malnutrition are particularly catastrophic for infants and young children.

Wise nutrition, which is instrumental in harmonious development of a child, formation of its physical, neuropsychological functions, the necessary level of immunological protection, constitutes a most important area of preventive measures in the system of medical care for children (Ye. Ch. Novikova, 1977; M. Ya. Studenikin and K. S. Ladodo, 1978). The distinction of infant nutrition is that it is necessary to provide for intensive plastic processes, which are related to growth and maturation of vital organs and systems, which imposes higher requirements on composition of food, primarily with regard to levels of complete protein and other essential constituents. Child nutrition is of great social significance, since it is one of the deciding factors in all subsequent development and health status of man. There are grounds to maintain that the probability of development of atherosclerosis, obesity [adiposity], diabetes mellitus and other diseases in adulthood depends significantly on the quality of child nutrition at the very earliest age.

In the USSR, the problem of nutrition, which is viewed integrally in its social and medical aspects, has been worked on with success since the first years of formation of our country. The Communist Party and Soviet government have repeatedly addressed themselves to questions of optimizing child nutrition, calling upon the greatest scientists to find a scientific answer to them, and among them we should mention with appreciation G. N. Speranskiy, M. S. Maslov, Yu. F. Dombrovskaya, A. F. Tur, O. P. Malchanova, A. A. Pokrovskiy and others, who did much to develop scientifically the different directions of child dietetics, validation and implementation of practical suggestions in the area of commercial production of food for children, public and individual nutrition.

The solution of medical aspects of the problem of child nutrition is based on the results of basic research on dynamics of metabolism in ontogeny and physiological nutrient and energy requirements of different age groups. These parameters are subject to the influence of numerous factors determined by scientific and technological progress, faster pace of life, increased intellectual load, change in nature of upbringing in school and at home, the acceleration phenomena, and this makes it imperative to periodically define and refine the formulas for a balanced diet and its adjustment to concrete living conditions and life style of children, with consideration of the rule of conformity of chemical structures of food to the enzymatic constellations of the body on all levels of metabolism (A. A. Pokrovskiy, 1972).

This is extremely necessary with respect to infants, particularly in the first 6 months of life, which are characterized by marked physiological and biochemical immaturity of the body, including enzymatic systems of the digestive tract. It is not by chance that, in expressly this period, the main food is mother's milk, the only product created by nature in the course of evolution that contains all of the necessary nutrients for an infant. The period of maturation of the child's digestive tract corresponds to a period of fine and gradual change in chemistry of mother's milk, which undergoes stages of colostrum, colostrum, transitory and complete ["mature"] milk. The latter also changes in composition during lactation, and this must be taken into consideration when defining formulas for balanced diet in specific periods of child development (Ye. M. Fateyeva, 1977).

The levels in mother's milk of immune proteins and other protective factors provide a high degree of immunological protection of the neonate (Figure 1), which is very important if we consider the immaturity of the immune system proper at the early stage of postnatal development (I. B. Kuvayeva et al., 1979). For this reason, nursing should be considered the ideal feeding, which provides for survival and adaptation of the infant to extrauterine living conditions, as well as normal physical and psychoemotional development. One must offer every support for breast feeding, including further work on questions of assuring the required level and duration of lactation, means of controlling it, as well as effective methods of advocating natural and wise feeding of infants (I. A. Arshavskiy, 1952; Gavinnelli, 1980).

Some interesting studies have been pursued in this direction at the All-Union Research Center for Mother and Child Care, USSR Ministry of Health, which proved the beneficial significance to the mother and newborn of early breast feeding (I. N. Razumovskaya et al., 1980). Nursing infants within the first hour after birth and then every 3.5 h had a beneficial effect on the mothers, involution of the postpartum uterus and lactation. This was associated with elevation of prolactin level in puerperal blood, which increased the amount and time of milk secretion and this, in turn, had a beneficial effect on infant development. Under such conditions, elevation of immunoglobulins G and M levels, properdin and complement were found in neonate blood. Intake with the first batches of colostrum of considerable amounts of lysozyme, secretory class A immunoglobulins, bifidogenic and other factors was instrumental in early breeding of protective microorganisms making up the normal microflora of the child's intestine (Ya. S. Shvartsman and L. B. Khazenson, 1978). All this provided high immunological resistance in infants and a decline in morbidity in the first year of life.

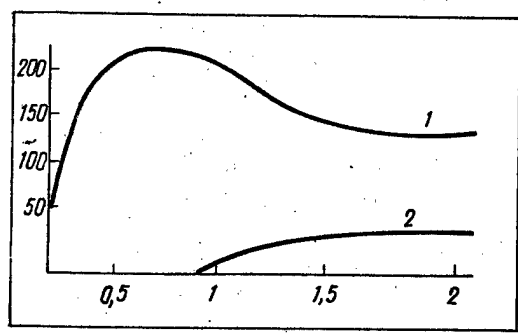


Figure 1.

Dynamics of immunoglobulin A (IgA) levels in coprofiltrates with breast feeding (1) and use of milk formulas (2). X-axis, age (months); y-axis, concentration of immunoglobulin A (mg%)

In our country, health care for pregnant and nursing women is a national concern, which includes an orderly system of measures aimed at providing optimum conditions for nursing mothers with regard to care, breast feeding and rearing their infants. A decree recently adopted by the CPSU Central Committee and Soviet government provides for additional paid leave for mothers to take care of their infants until they are 1 year old, as well as other substantial benefits.

At the present time, in all countries of the world a significant part of infants are deprived of breast feeding for different reasons. According to the data of American and Polish authors, up to 50% of the neonates are switched to

artificial or mixed feeding already at the time they are discharged from the maternity home (Cunningham, 1977; Szotowa et al., 1980). The possibility of a good start in life is often ruled out by virtue of the inadequacy of such nutrition, and this is fraught with serious consequences, in the form of rise in morbidity and mortality indicators, impairment of physical and mental development. In the USSR, the percentage of infants partially or completely deprived of maternal milk is not as high. In Kazakhstan, for example, the share of mothers who do not nurse up to the age of 4 months constitutes 32%, and it rises in later age periods. For this reason, the problem of artificial infant feeding is acquiring extremely great importance.

Nowadays, many varieties of foods for infants are being produced. Among them, so-called woman's milk substitutes merit special attention; they are prepared on the basis of cow's milk, rendering it closer to human milk by lowering the concentrations of protein and calcium salts in the end product, and enriching it with polyunsaturated fatty acids, readily assimilated carbohydrates, certain vitamins and trace elements. In our country, several human milk substitutes have been developed, which have gained wide use in infant feeding. Dry milk mixtures proposed by the Institute of Nutrition, USSR Academy of Medical Sciences, have proven themselves well, in particular, "Malyutka" intended for neonates and premature babies and "Malysh" for infants from 1-2 months to 1 year old. Acidophilus analogues of these mixtures were found to be effective in prevention and treatment of gastrointestinal diseases. "Vitalakt" and "Ladushka," which were developed by Kiev scientists for mixed and artificial infant feeding, including premature babies, are also among products that are similar in composition to human milk. A sour milk product, "Biolakt," which was proposed by the Kirghiz Institute of Obstetrics and Pediatrics, as well as "Laktobakterin," which was developed by the Gorkiy Institute of Epidemiology and Microbiology, and other products have also been found valuable.

In recent years, appreciable advances have been made in the area of human milk substitutes. Variants of milk mixes have begun to be produced, which contain cow's milk serum proteins, and this enhances significantly the biological value of these products. Work is in progress to improve the fat composition of milk mixes. Clinical trials of the "Malyutka" mix with a new fat composition showed that there was greater assimilation of lipids, even by premature babies, which is indicative of the desirability of making a similar correction in the formula of other milk mixes produced by industry. It will also be necessary to upgrade in the immediate future the carbohydrate element of baby products. Evidently, most of it should consist of a mixture of carbohydrates with prevalence of lactose, as in mother's milk.

The problem of feeding premature babies, who are notable for a rather unique course of the adaptation period, more marked manifestations of physiological and biochemical immaturity of the digestive system, is of exceptional importance. There are data to the effect that even mother's milk is not adequate for such infants and, consequently, should undergo certain adjustment (Davies, 1977; Steichen et al., 1980). Successful care of premature babies is an important reserve for lowering child mortality. The diet prescribed for them, which often emerges as an element of intensive therapy, must be based on clearcut knowledge of the functional distinctions of their digestive system and metabolic processes as a whole. Since hypogalactia is one of the rather frequent consequences of premature parturition, the problem of feeding premature babies involves development of both natural and artificial food for them. Studies pursued at the Institute of Pediatrics and Institute of Nutrition, USSR Academy of Medical Sciences, have made a substantial contribution to work on theoretical and practical aspects of this problem (Ye. Ch. Novikova et al., 1980; K. S. Ladodo et al., 1980). However, there is still much to clarify in this direction. For example, the question of protein requirements of premature babies is still being debated. The answer should be approached from the standpoint of investigation of metabolism of individual amino acids, primarily essential ones as they relate to other essential nutritional factors. The need to define optimum parameters of the lipid component in the diet of premature babies merits the closest attention. Several in-depth studies on this score demonstrated the great influence of the qualitative composition of fats in breast milk and milk mixes on the fatty acid composition of tissues and cellular structures. Still to be identified are several important aspects of digestion, condition of peristaltic, evacuating and enzyme-secreting functions of the stomach and intestine, function of the pancreas at the earliest ontogenetic stages, metabolism of bile acids, etc.

Thus, in spite of the advances that have been made, the problem of artificial feeding of infants is still far from a definitive solution. Moreover, some adverse consequences have been discovered from extensive use of artificial mixes, which were manifested, in particular, by consistent increase in infants' sensitization to nutrient and other allergens, insufficient resistance to adverse environmental factors, including infectious agents (T. S. Sokolova et al., 1977).

Much work is being done in our country to further optimize the composition of milk mixes, their enrichment with protective and biologically active factors inherent in human milk, including immunoglobulins, enzymes, bifidobacteria,

lactobacilli, etc. Within the framework of a state special-purpose program, scientists from prominent scientific institutions of our country are participating in this work: Institute of Nutrition, USSR Academy of Medical Sciences, and its Kazakh Affiliate, Gorkiy Institute of Pediatrics, Moscow and Gorkiy institutes of epidemiology and microbiology, and others. The program calls for investigation of the problem of child nutrition in relation to climate, geographic, national and other regional distinctions of our country, with use as well of traditionally local types of food raw material. The Kazakh Affiliate of the Institute of Nutrition, USSR Academy of Medical Sciences, together with the Institute of Pediatrics, Kazakh Ministry of Health, have made a study of actual diet and health status of children in Kazakhstan. Various forms of nutritional disturbances and diseases caused by them were found. The most widespread finding was a shortage of essential amino acids---lysine, methionine, threonine, vitamins A, C and B group. Rickets, hypotrophy, anemia, exudative diathesis and obesity were often encountered among the diet-related diseases. The role of internutrient correlations was demonstrated, in particular, protein-lipid-carbohydrate, protein-vitamin and intervitamin relations in development of the above states; it was established that there are unbalanced protein-deficient forms of rickets, functional hypovitaminosis A, D and C, vitamin-dependent forms of endogenous protein deficiency. A direct correlation was established between incidence of diseases, in the distribution of which the nutritional factor is dominant, and infectious-inflammatory diseases that are the greatest cause of child mortality. It was shown on experimental models of various forms of protein and vitamin deficiency that this link is attributable primarily to decline of immunological reactivity of the body, the mechanisms of which are notable for certain unique features, depending on the specific alimentary disorder (T. Sh. Sharmanov and Sh. S. Tazhibayev, 1978). All this was taken into consideration in developing new foods for children enriched with essential and protective factors, in order to further adapt them to the requirements of the child's body (T. Sh. Sharmanov and P. V. Fedotov, 1979).

Because of our disapproval of rigid technology for preparing dry and sterile products, which inevitably leads to breakdown of biologically active substances, we worked on development of fermented [sour] milk products. The basically important distinction of the mixtures we developed is that they include, as a supplement, yolk emulsion which has exceptional nutrient value and is the carrier of all of the most important biologically active substances. The fermented milk product, "Baldyrgan," is prepared on the basis of cow's whole milk, and it is intended for infants starting at the age of 3 months. Another product, "Balbobek," which was developed on the basis of whey, is adapted for infants up to 3 months old, including premature babies, with regard to total protein content and proportion of casein and serum fractions in it (see Table).

The high biological value of these products is also due to their enrichment with vegetable oil, some vitamins and trace elements, as well as lysozyme. Sparing processing technology, with use of bacterial fermentation of specially selected strains of lactobacilli, preserves the biological activity of nutrients, preparing the product, to some extent, for digestion and assimilation in the digestive tract, enriches it with enzymes, including proteolytic ones, antibacterial and other protective factors that are formed as a result

of vital functions of microorganisms, which also have a beneficial effect on the infant's intestinal microflora. The combined approach to solving problems of composition and technology of development of child food products and enrichment thereof with protective factors merits further development.

Composition of dairy products for child nutrition, "Balbobek" and "Baldyrgan," developed by the Kazakh Affiliate of the Institute of Nutrition, USSR Academy of Medical Sciences, as compared to human and cow's milk

Constituents	Milk		Milk formulas	
	human	cow's	"Balbobek"	"Baldyrgan"
Protein, g%	1.3	3.2	1.8	3.2
Casein/serum protein ratio	50/50	80/20	52/48	80/20
Fats, g%	3.5	3.2	3.5	3.5
Carbohydrates, g%	7.5	4.5	7.2	7.2
Vitamins, mg%: A	0.06	0.03	0.07	0.07
E	0.7	0.1	0.6	0.6
PP	0.4	0.2	0.6	0.6
C	4.0	1.5	6.5	6.5
Minerals, mg%: iron	0.1	0.07	0.6	0.6
calcium	33	125	90	125
phosphorus	15	96	76	96
copper	0.05	0.02	0.05	0.05
Protective factors:				
lysozyme, mg/l	30	0	25	25
antibacterial substances, units	40	0	35	35
lactobacilli, millions of microbial bodies	1	0	200	600

During the last 5 years, "Baldyrgan" and "Balbobek" were submitted to extensive trials in pediatric institutions of Kazakhstan, clinics in Moscow and Tashkent. Their high nutritional value was demonstrated, and it provided for the same rate of weight gain and growth, as well as psychoemotional development, as breast feeding. Their marked protective properties are manifested by lower indicators of infant morbidity (Figure 2). The protective effect is particularly significant with regard to gastrointestinal diseases, and this is related to normalization of intestinal microbiocenosis and the other factors mentioned above (Figure 3). As compared to other foods for children, "Baldyrgan" and "Balbobek" have milder sensitizing properties and they cause development of exudative diathesis considerably less often. The low allergenicity of these products, in spite of the fact that they contain egg white [or protein], is attributable to preliminary hydrolysis of the latter with pepsin followed by bacterial fermentation of the formulas. At the present time, industrial production of these formulas has started up in Kazakhstan. We also developed dry and liquid multicomponent supplements to enrich formulas for infants. They are prepared on the basis of hen's eggs, contain readily assimilated proteins, fats, vitamins and trace elements. The supplements include enzymes that play a protective role (for example, lysozyme) and compensate for the functional immaturity of the infant's digestive system. These approaches do not exhaust all the possible routes for

solving the problem of artificial food for infants, while they do indicate a need for even more vigorous work on it.

In devoting much attention to infant feeding as the most vulnerable to adverse environmental factors, we cannot overlook nutrition aspects pertaining to other age groups. At the present time, much work is being done in our country on the study of actual diet of preschool children, and it will result in development of new specialized foods and scientifically validated recommendations to improve organization of nutrition for this category of children. It is of great national importance to continue the search for the means of optimizing the diet of school children, expanding the assortment and increasing the biological value of special products for them, which take into consideration the current nature of education, intensity of mental and physical loads (L. V. Druzhinina, 1980).

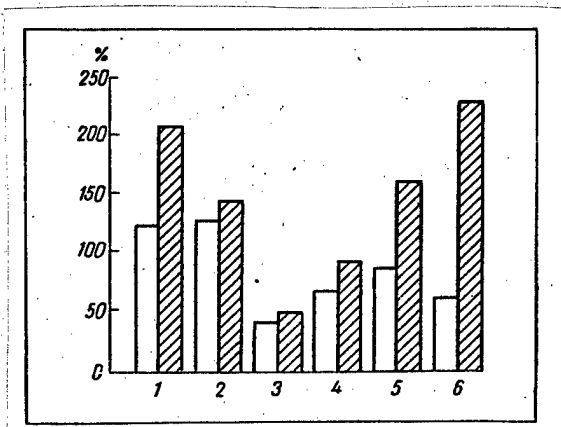


Figure 2.

Incidence of diseases as related to different types of feeding (breast feeding taken as 100%)

- 1) hypotrophy
  - 2) rickets
  - 3) anemia
  - 4) exudative diathesis
  - 5) acute respiratory disease and pneumonia
  - 6) intestinal infections
- White bars--"Balbobek";  
cross-hatched--"Biolakt"

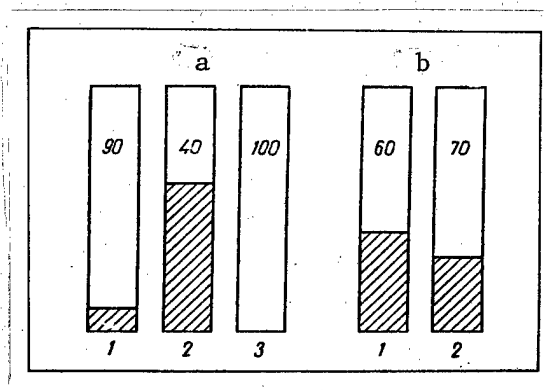


Figure 3.

Incidence (%) of dysbacteriosis (white section of bar) in children with different types of feeding

- a) term babies:
  - 1) heated donor milk
  - 2) "Balbobek"
  - 3) "Malyutka"
- b) premature babies:
  - 1) breast feeding
  - 2) "Balbobek"

There are some serious and urgent problems in the area of therapeutic nutrition for children. Much attention should be given to specialized care of children with hereditary metabolic pathology, for which the only method of treatment is therapeutic diet. Development of new specialized products (lactose-free mixes, enpit [enteral nutrition?], products with low protein content) by the Institute of Nutrition, USSR Academy of Medical Sciences has largely facilitated organization of therapeutic feeding, which is growing increasingly pathogenetic. Further progress in this direction can be made primarily by improved early detection of these diseases and increased production of the necessary therapeutic

agents. Such problems as parenteral feeding of infants in the presence of various diseases, therapeutic diet and use of specialized products in cases of mucoviscidosis, celiac disease, impaired intestinal absorption syndrome require more comprehensive work. The problem of food allergy, further investigation of mechanisms of its development, refinement of diagnostic and therapeutic measures for allergic diseases merit serious attention (A. D. Ado, 1980; A. A. Pokrovskiy et al., 1972; V. A. Shaternikov, 1980). One should bear in mind two factors with respect to pathogenesis of alimentary allergy as related to change to artificial feeding: in the first place, the antigenic composition of the food product and its adequacy to the infant's immunological status; in the second place, conditions and time of changing the infant to artificial feeding. Studies of immunological responses of animals to intake of antigens by mouth in the early postnatal period revealed that they develop immunological tolerance to different allergens. Evidently, the increased permeability of the intestinal wall to food antigens and distinctions of immunological reactions in infancy create the conditions for purposeful and specific intervention in immunological processes, including allergic ones (T. Sh. Sharmanov, 1981).

Proper organization of the entire dietological service and establishment of the appropriate industrial base are very important to providing for nutrition of the child population of our country. In recent years, some advances have been made in this important matter. Three very large specialized enterprises have been built: canned milk combines for production of the dry, adapted milk formulas, "Malyutka" and "Malysh," in Istra, Khorol and Volkovysk, which put out up to 28,000 tons of products per year. A canned milk combine for child feeding has been started up in Balta, Odessa Oblast, where a new milk formula, "Detolakt," has started to be produced, which is very close to human milk in composition. An analogous plant is under construction in Sibay, Bashkir ASSR, which will produce a special dietetic product, "Enpit," for children with various congenital and chronic pathology. Steps are being taken in the Union republics to open up special factories and lines at the municipal dairy plants to produce liquid milk formulas for infants up to 1 year old.

There is an interagency commission under the USSR Ministry of Health that coordinates measures related to work on pressing problems of child nutrition.

Thus, child dietology has expanded the area of its influence appreciably in the last years. This is largely related to the fact that specialists have joined forces to work on optimization of nutrition for infants. However, there are still many problems ahead of us, and further progress in this important direction of child care depends on solving them. Their successful solution can be expected only by further identifying the laws of assimilation of food and metabolism in the course of development of the healthy child, as well as under pathological conditions. Justification and importance of practical recommendations for public health agencies, agriculture and the food industry depend on the depth and results of such studies. The medical and social relevance of further development of science of nutrition, as it relates to childhood, is determined by its deciding role in the fight for the health of children and harmonious development of future generations.



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CSO: 1840/552

#### PREVENTION OF HEART, BLOOD DISEASES DISCUSSED

[Editorial Report] Tashkent SOVET OZBEKISTONI in Uzbek 7 April 1983 carries on page 4 a 900-word article by R. Katsenovich, corresponding member of the UzSSR Academy of Sciences and director of the Uzbekistan Research Institute for Cardiology, titled "Take Care of Your Heart." Katsenovich describes some recent research aimed at prevention of heart and blood diseases such as ischemia, high blood pressure, and high blood cholesterol. According to one study, one of every 10 males aged 40-59 in Tashkent has overt or covert symptoms of heart ischemia, one of every four has high blood pressure, and one of every five has high blood cholesterol. A basic prevention measure for such diseases is the development of a health lifestyle, one with a good diet and physical exercise and without smoking, drinking and over-eating. In an institute study of more than 10,000 youths aged 7-16 a certain portion of these was found to have high blood pressure. This shows that development of good habits must begin in childhood. Proper diet and exercise and abstention from alcohol was also shown to be effective in a 1981-1982 institute program for adults suffering from these diseases.

CSO: 1836/18

## PHYSICIAN'S DUTY

Moscow MOSKOVSKAYA PRAVDA in Russian 20 Mar 83 p 2

From a resolution by the CC CPSU and USSR Council of Ministers, "Measures for further improvement of public health"

[Abstract] Polyclinic No 51 in Moskvoretskiy Rayon has been a leader in the entire RSFSR for 4 years. The secret of polyclinic No 51--visited each day by almost 2000 persons including laborers, white collar workers, homebodies, pensioners, students, athletes--diverse people with different concerns, fears and hopes, but the physicians, nurses and corpsmen have but a single goal: each visitor is to receive modern, qualified medical assistance from the polyclinic, the best of modern medicine. At polyclinic 51, useless wasting of time, sitting and waiting to see medical personnel is virtually unheard of. Clinical hospitals Nos 7, 15, 20, 24, 31, 56 and 61 also enjoy excellent reputations in Moscow. However, there are many medical institutions whose activity could be greatly improved by following the example of these superior institutions. The duty of the physician and the middle medical worker, practice has repeatedly proven, is to maintain therapeutic and diagnostic work at the most modern level of medical science. Where this is done, patients are well served and the public health is maintained. The November (1982) Plenum of the CC CPSU emphasized that it is important that each medical worker perform his duties better, serving his patients in a superior manner. We must always recall that the human patient who has come to a medical institution for assistance deserves timely, effective and well-qualified medical assistance. [514-6508]

UDC: 362.7+616-058.2-082

## ROLE OF COMPLEX EVALUATION OF CHILDREN'S HEALTH IN THE IMPROVEMENT OF THERAPEUTIC AND PROPHYLACTIC WORK

Moscow SOVETSKOYE ZDRAVOOKHRANENIYE in Russian No 3, Mar 83  
(manuscript received 19 May 82) pp 8-16

IGNAT'EVA, R. K., candidate of medical sciences, All-Union Scientific Research Institute of Social Hygiene and Organization of Public Health imeni N. A. Semashko, USSR Ministry of Health, Moscow

[Abstract] Implementation of the preventive trend in socialist public health, providing for the organization of constant and continuing observation of

the health of the entire juvenile population, not only those who are known to be sick, requires that every children's health organization leader and even individual pediatrician know the status of health of all of his patients. The idea of defining groups of health levels developed as early as the 1930s in connection with the requirements for practical public health maintenance and the development of preventive dispensary services. The most difficult problem is development of criteria for evaluating persons with various degrees of health problems and their placement in various groups. Four criteria have been suggested by Soviet authors for this evaluation: 1) the functional status of the primary organs and systems; 2) resistance and reactivity of the organisms; 3) level of development achieved and harmony of this development; 4) presence or absence of chronic pathology. A table is presented of instructions for placement of preschool children into various health groups based on the four criteria. Four years experience in utilizing this method of combined evaluation of children's health in Lipetsk Oblast have revealed no difficulties in distributing the children among health groups. The use of combined evaluation of the health of children helps to analyze the effectiveness of measures for improving the health of the young population. References 9: 4 Russian, 5 Western.  
[479-6508]

UDC: 614.7:313.13

#### INFORMATION SYSTEM ON STATE OF HEALTH AS A FUNCTION OF QUALITY OF ENVIRONMENT

Moscow SOVETSKOYE ZDRAVOOKHRANENIYE in Russian No 3, Mar 83  
(manuscript received 29 Jul 82) pp 16-19

KORNEYEV, Yu. Ye. and ZAICHENKO, A. I., Scientific Research Institute of General and Communal Hygiene imeni A. N. Sysin, USSR Academy of Medical Sciences, USSR Ministry of Health, Moscow

[Abstract] The resolution of the USSR Council of Ministers and CC CPSU of 1 December 1978 "On additional measures to improve the protection of nature and improve the utilization of natural resources," emphasizing the need to perform extensive studies on the influence of pollution on public health served as a basis for creation of the state system of collection, processing and analysis of information on the variation in the status of health of the population as a function of environmental quality. Information obtained and processed in accordance with the methodologic instructions published with the resolution has served as the basis for many scientific and practical works on the influence of environmental factors on public health. The instructions developed by the institute have standardized the system of collection, processing and analysis of materials on the morbidity of the population when exposed to environmental pollution factors. Three different services are involved in this work; city sanitary-epidemiologic stations, local state hydrometeorological committee services and the statistical administration, but the sanitary-epidemiologic stations perform most of the practical work. The practical basis of the systems which have been developed for consideration of

environmental factors is the operational service for tracing the status of health of the population and the quality of the environment created at the city level. A diagram is attached, showing that the automated system of controlling the health of the population by optimization of environmental quality is designed to consider and analyze a number of variables, many of which are analyzed as both individual and integrated health determining factors. The entire operation is computerized, allowing prediction of the effect of environmental quality on the morbidity of various diseases. The sanitary-epidemiologic service is presently involved in the performance of qualitatively new work because of this task. Obviously, it would be desirable for a portion of this work to be handed over to therapeutic and prophylactic institutions.  
[479-6508]

UDC: 614.2(575.2)

#### CLASSIFICATION OF AGRICULTURE RAYONS OF KIRGHIZIA FOR ORGANIZATION OF PUBLIC HEALTH SERVICES

Moscow SOVETSKOYE ZDRAVOOKHRANENIYE in Russian No 3, Mar 83  
(manuscript received 30 Dec 81) pp 23-25

ABDULLIN, K.D., Department of Social Hygiene and Organization of Public Health (headed by honored activist of science of the Kirghiz SSR, Professor A. A. Aydaraliyev), Kirghiz Medical Institute, Frunze

[Abstract] A differentiated approach toward planning of rural public health services, efficient distribution of materials and equipment, medical personnel, etc., requires a scientifically well-founded regionalization of the territory being serviced. The agricultural territory of the republic has now been regionalized. In regionalizing the republic the unit of accounting taken was the territory of an agricultural rayon, since the work of organizing public health services is territorially and administratively organized by rayons. Materials were selected and processed for each of 40 agricultural rayons in the republic based on the characteristics of: fraction of the population residing in urban areas, fraction of animal husbandry workers, fraction of native nationality population, juvenile population, retired population, population density, number of populated points (cities and villages), distance from rayon hospital to oblast hospital, climatic-geographic characteristics, fecundity, infant mortality and natural population growth. A brief description of the agricultural rayons of each class is presented. The practical significance of the classification of rural administrative rayons is its facilitation of a differentiated approach to classification from the standpoint of public health, party and soviet organizations. References 5 (Russian).  
[479-6508]

## EVALUATION OF UTILIZATION OF EMERGENCY MEDICAL SERVICES

Moscow SOVETSKOYE ZDRAVOOKHRANENIYE in Russian No 3, Mar 83  
(manuscript received 29 Jan 82) pp 28-30

DUMBROV, D. A. and KUSTOVA, Ye. A., City Clinical Emergency Medical Hospital, Odessa

[Abstract] The utilization of emergency medical services [skoraya meditsinskaya pomoshch] has shown a tendency to decrease in recent years due to the improvement of organization of ambulatory polyclinic services and specialization of hospital services. According to the author's station, emergency medical service utilization is, however, increasing. A questionnaire was distributed among patients to determine the reasons for this divergence in national and local experience. The study confirmed a prevalence in the structure of the overall morbidity of cardiovascular disease, amounting to 61% of emergency medical service calls. Considering that 42% of all persons filling out the questionnaires were under polyclinic medical observation, it became quite obvious that the quality of preventive dispensary services and effectiveness of medical services performed by the medical service could stand improvement. More than half of those interrogated call out the emergency medical service quite frequently (weekly), 4% of the patients very frequently, several times per day over long periods of time. It is concluded that a large group of patients, primarily elderly patients suffering from chronic diseases, utilize the emergency medical services as a polyclinic on wheels. No less interesting is the fact that 40% of the patients report that it is easiest to receive hospital services by calling the emergency medical service, since physicians frequently do not have the authority to hospitalize them on a planned basis to serve the needs of treatment for chronic diseases. The main shortcoming of emergency medical services determined, in addition to the misutilization of the services by those who should be under chronic medical care, is the delay in response to calls, largely a result of the overutilization of the services by a relatively small number of chronic disease patients. References 3 (Russian).  
[479-6508]

UDC: 614.3/4:613.95([47+57]-22)

## CHARACTERISTICS OF RURAL RAYON SANITARY EPIDEMIOLOGIC STATION ACTIVITY RELATED TO HYGIENE OF CHILDREN AND ADOLESCENTS

Moscow GIGIYENA I SANITARIYA in Russian No 9, Sep 82  
(manuscript received 27 Jan 82) pp 56-59

TUROVETS, G. L., Scientific Research Institute of Hygiene of Children and Adolescents, USSR Ministry of Health, Moscow

[Abstract] To estimate the current state of medical-sanitary support of children living in rural areas, the author studied the organization of work and annual volume of activity related to hygiene of children and adolescents,

in 1979-1980 in 30 agricultural rayon sanitary-epidemiologic stations of all categories in 5 territories of the nation with specific sanitary-demographic factors. The difficulty of planned sanitary supervision of educational institutions in these areas is increased by their significant distance from the sanitary-epidemiologic stations. The primary effective monitoring of the sanitary situation in such educational institutions was the use of instrumental and laboratory methods in examinations of the students. A number of studies called for by the official instructions of the main sanitary-epidemiologic administration of the USSR Ministry of Health since 1967, such as the content of dust, mercury vapor, organic substances in the air, soil contamination, noise level, etc., were not performed at all. The effectiveness of sanitary supervision and authority of the sanitary physician increase immeasurably if the physician has at his disposal a portable set of instruments designed to perform the tests of his specialty. The need has arisen to determine the quality of activity of hygiene departments for children and adolescents which should be based on the final goal of all sanitary work, improvement of the status of health of the juvenile population.  
[496-6508]

UDC: 613.95"1922-1982":614.3/4(094.1)(470)"1922"

#### DEVELOPMENT OF PEDIATRIC HYGIENE IN THE USSR

Moscow GIGIYENA I SANITARIYA in Russian No 9, Sep 82  
(manuscript received 13 May 82) pp 23-26

SERDYUKOVSKAYA, G. N., Institute of Hygiene of Children and Adolescents, USSR Ministry of Health, Moscow

[Abstract] During the period of existence of pediatric hygiene as an independent branch of medicine and practical public health, a great deal has been done in the area of development and introduction of hygienic regulations of many factors of the environment influencing the development and formation of the juvenile organism. The conditions of education of children in schools of various types must be at the forefront of attention of sanitary physicians. The importance of studies performed in schools has increased particularly in recent years as education has been transformed to meet the requirements of the scientific and technical revolution. Studies show that the total length of study activity of older students, both in school and at home, is greater than the length of the working day of adults, reducing the time children spend outdoors and their sleep time. Many hygienic recommendations intended to prevent overfatigue have been reflected in the instructions of the secondary general educational schools and newly affirmed "sanitary rules for design and maintenance of general education schools" published in 1975 by the USSR Ministry of Health in coordination with the USSR Ministry of Education. Studies have resulted in the development of specific recommendations for the organization of lessons and requirements for planning, arrangement, size and equipment of schoolrooms and kindergarten spaces. It has long been known that one of the most important conditions for preservation and improvement of



children's health is maximum utilization of physical culture and sports activity both at school and at home. Biocybernetic principles and methods of determining optimal condition of the body for various types of educational, labor and sports activity of children and young adults have also been developed. Methodologic recommendations have been developed for combined evaluation of the status of health of children and young adults in massive medical examinations, screening tests for massive numbers of students, methods of measuring the blood pressure of children and youth during mass-scale medical examinations and measures for preventing hypertension.  
[496-6508]

#### LITHUANIAN ACHIEVEMENTS IN PUBLIC HEALTH

Vilnius SOVETSKAYA LITVA in Russian 18 Jun 83 p 3

PLATUKIS, I., Minister of Health, Lithuanian SSR

[Abstract] In honor of "Medical Workers' Day", 19 June, the Minister of Health of Lithuanian SSR cites some achievements. The republic now has over 14,000 physicians, and almost 42,000 mid-level medical workers. Among scientific workers in medicine there are almost 100 doctors of medical science and 600 candidates of medical science. Each year some 600 physicians and 900 mid-level medical specialists are graduated in the republic. There are now 41 physicians and 114 nurses per 10,000 residents in Lithuania. A broad integrated program of prevention of chronic noninfectious disease has been successfully introduced in the republic. Some shortcomings are also noted. The achievements of science are not utilized to the fullest in dentistry, traumatology, ophthalmology and otolaryngology. Unworthy physicians are still found here and there. Improved political indoctrination work and increased self criticism is expected to remedy the situation, however.  
[537-6508]

UDC 616-08-039.57(575.1-22)

#### IMPROVEMENT OF OUT-PATIENT AID IN UZBEKISTAN

Moscow SOVETSKOYE ZDRAVOOKHRANENIYE in Russian No 6, Jun 83  
(manuscript received 29 Jun 82) pp 9-12

TULYAGANOV, K. S., First Deputy Minister of Health, UzSSR

[Abstract] Improvement of out-patient aid for the rural population is due to an increase of the number of rural physician-staffed ambulatoriya from 67 in 1965 to 650 in 1981, an increase of the number of physicians/10,000 population from 4.2 in 1965 to 9.2 in 1981 and an increase of paramedical personnel from 27,580 in 1970 to 42,904 in 1981. These increases in medical personnel were

accompanied by a strengthening of the material and technical base of Uzbekistan medical institutions in the 9th Five-Year Plan and 10th Five-Year Plan. Studies of morbidity among sovkhos and kolkhos workers and implementation of appropriate medical measures have greatly reduced the number of work-days lost. The existing network of central rayon hospitals, rural uchastok hospitals and rural physician-staffed ambulatoriya is rapidly reducing the gap between the quality of medical care in rural and urban areas. Emphasis will be placed on continuance of this trend to improve public health care in Uzbekistan even more.

[551-2791]

UDC 614.2:312.28

#### DEMOGRAPHIC AGING AND PUBLIC HEALTH PROBLEMS

Moscow SOVETSKOYE ZDRAVOOKHRANENIYA in Russian No 6, Jun 83  
(manuscript received 15 Nov 82) pp 12-16

CHEBOTAREV, D. F., Institute of Gerontology, USSR Academy of Medical Sciences, Kiev

[Abstract] Problems related to demographic aging throughout the world were discussed against United Nations data. These data predict a 224 percent increase in the number of persons over 60 years of age from 1975 (350 million) to 2035 (1100 million) and an increase in world population from 4.1 billion to 8.2 billion with a life expectancy of 17 years for men and 21 years for women at 60 years of age with special emphasis being placed upon the impact of demographic aging patterns in the USSR in the coming decades. The significance of differences in chronological age and biological age in older people and of differences in morbidity and mortality patterns for men and women is discussed. Absence of physical debility, chronic illness and social and economic dependence in many elderly persons testifies to the importance of proper preparation and planning for this stage of life. Programs aimed at preparing people for old age should consider physical, mental, social, spiritual and environmental factors as well as medical factors. Plans for retirement should be made at least 1 or 2 years before retirement. The author recommends greater employment of pensioners in the national economy, the organization of mutual assistance groups among the aged themselves and the continuation of physical and mental activity by persons after retirement.

[551-2791]

## LONGEVITY AND LIFE EXPECTANCY OF MEN AND WOMEN IN KIRGHIZIA

Moscow SOVETSKOYE ZDRAVOOKHRANENIYE in Russian No 6, Jun 83  
(manuscript received 31 May 82) pp 16-19

BURMIN, L. S., candidate of medical sciences, Frunze Municipal Health  
Department (Chief I. A. Asenbekov) KiSSR

[Abstract] Statistics concerning longevity and life expectancy show that 20,000 to 30,000 persons per 100,000 births reach the age of 80 years, in the KiSSR, with 18,000 to 20,000 women being included in these figures. For the last 30 years, mortality rates have been higher for men than women in the KiSSR. Male mortality was twice as high as female mortality in 1979 with heart disease, lung diseases and cancer being the chief causes for this difference. A medico-social study of 2000 persons living in various climatic-geographic zones of the republic showed that the state of health of middle age and elderly women is worse than that of men in these regions in spite of better longevity indicators for women. This seeming contradiction is explained by the fact that high mortality among middle-age and elderly men reduces the number of weak and sick. Poor health in women is attributed to a work load equal to that of men in many cases and the added stresses from domestic work and maternity. Women also suffer less from exposure to harmful external effects than men and they smoke less and consume less alcohol. The fact that atherosclerosis develops about 10 years earlier in men than in women is very significant as a major problem of gerontology.

[551-2791]

## MEANS OF IMPROVING QUALITY OF OUT-PATIENT AID TO RURAL POPULATION

Moscow SOVETSKOYE ZDRAVOOKHRANENIYE in Russian No 6, Jun 83  
(manuscript received 30 Sep 82) pp 42-45

ZHIDOVICH, I. A., BROVKOVICH, V. Kh. and MELEN'KO (Kobrin City Brest Oblast)

[Abstract] Reorganization and reconstruction of out-patient aid to the rural population of Kobrin Rayon in Western BSSR (a population of 50,000 persons with 163 villages) were described. The rural ambulatoriya are staffed by an internist, a pediatrician and a dentist and are equipped with medical transportation facilities with a capacity to service up to 4000 persons within a distance of 11 kilometers. These clinics permit improved diagnosis and preventive measures. They have been especially effective in reducing the number of work-days lost, in making medical aid available in the early stages of diseases and in reducing child mortality. The reconstruction of rural health care has been especially effective in tuberculosis control. These ambulatoriya have made it possible to provide medical aid to rural inhabitants which is comparable to the medical care provided to urban populations. References 2

(Russian)

[551-2791]

## URGENT PROBLEMS OF ANTENATAL HEALTH PROTECTION OF THE FETUS AND CHILD

Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR in Russian No 11, Nov 82  
(manuscript received 17 Jun 82) pp 11-17

POBEDINSKIY, N. M. (Moscow) and TIMISHENKO, L. V. (Kiev)

[Abstract] Factors leading to a "high risk of perinatal pathology" are listed and aspects of clinical, endocrinological, ultrasound and genetic diagnosis of antenatal disorders are discussed with consideration of groups of women in "high-risk" categories. Some hormonal parameters of transport of gametes are discussed and it is reported that transport of gametes occurs at a certain ratio of estrogens to dehydroepiandrosterone. A new concept, "fertile menstrual cycle", i.e., a cycle in which all known parameters make conception most likely, is discussed. Special emphasis is placed on problems encountered in the first trimester of pregnancy. Hormonal parameters of a normally-developing pregnancy are discussed and signs of disturbances are described. Interruption of pregnancy in the first trimester is associated with impairment of cortical function in 30 percent of the cases. The important role of echography in early monitoring of embryonal development and in reducing the length of hospitalization of women with threatened abortion is described. The role of transcervical biopsy of the chorion in diagnosing hereditary disorders is discussed. The importance of prenatal diagnosis of genetic and developmental disorders in the second trimester is discussed. Fetoscopy is used to detect slight anomalies of the extremities. The importance of early detection of fetal hypotrophy is emphasized. The importance of diagnosis of chronic or acute fetal hypoxia in the third trimester is shown and tactics for treatment of chronic fetal hypoxia are given. The importance of determining delivery tactics and of detecting pathologies which have a bearing on selection of these tactics is discussed. A need for further study in the area of antenatal diagnosis of the state of the embryo and fetus is emphasized. References 14: 10 Russian, 4 Western.  
[553-2791]

UDC 362.172(47+57)

## LABOR PROTECTION AND HEALTH PROTECTION FOR WORKING WOMEN

Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR in Russian No 11, Nov 82  
(manuscript received 17 Jun 82) pp 17-21

NOVIKOV, Yu. I. (Leningrad) deceased, VOLKOVA, Z. A. (Moscow),  
MALYSHEVA, R. A. (Sverdlovsk), VELICHKOVSKIY, B. T. (Moscow) and  
OGLEZNEV, G. A. (Omsk)

[Abstract] Labor protection and protection of the health of working women, who make up half of work force in addition to their maternity role, is discussed as one of the most important problems of hygiene today. Protective measures

which permit women to fulfill this dual role are presented in article 35 of the USSR Constitution. Results of studies and collaboration of some institutes investigating the effect of environmental factors (especially chemical factors) of production processes on the course of pregnancy, birth, fetal and neonatal development and gynecological morbidity among women workers are described. Complexes of measures which greatly reduce the damaging effect of production factors on the bodies of the mother and child are discussed. Measures which should be introduced as soon as possible are discussed.  
[553-2791]

UDC 618.32/.38:362.7

#### INTRANATAL PROTECTION OF THE FETUS AND PRESENT-DAY OBSTETRIC STRATEGIES

Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR in Russian No 11, Nov 82  
(manuscript received 17 Jun 82) pp 21-28

VIKHLIYAYEVA, Ye. M., All-Union Scientific Research Center For Health Protection of the Mother and Child, Moscow

[Abstract] Development of a new science, perinatology, over the last 20 years has been one of the major events in clinical medicine. Knowledge obtained in this area creates the possibility of detecting afflictions of the fetus under intranatal conditions which, in combination with adequate prenatal diagnosis and rational delivery tactics, helps to reduce perinatal morbidity and mortality. One of the major tasks of gynecology-obstetrics practice is the non-medical preparation of the mother's body for pregnancy with consideration of reserves of the cardiovascular system since circulatory adaptation is one of the main factors ensuring optimum conditions for development of the fetus and placenta and for creating resistance of the maternal body to birth trauma. The roles of circulatory adaptation in pregnancy, in formation of the vascular zone of maternoplacental circulation and in establishment of various functions of the fetoplacental system are described. Main clinical forms of fetoplacental insufficiency are discussed and means for their detection and measures to counteract it are described. The importance of systematic monitoring to detect abnormalities in high-risk groups is emphasized. The importance of use of cardiotocography for diagnostic purposes is described. The diagnostic importance of the study of the acid-base balance in the fetal blood is described. Basic strategies of current obstetrical practice are presented. Figures 5; references 21: 11 Russian, 10 Western.  
[553-2791]

## MEDICAL PROBLEMS RELATED TO GROWTH AND DEVELOPMENT OF HEALTHY CHILDREN

Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR in Russian No 11, Nov 82  
(manuscript received 17 Jun 82) pp 28-34

STUDENIKIN, M. Ya. (Moscow)

[Abstract] The study of peculiarities of mechanisms of complex adaptational-regulatory activity of the growing organism and improvement of this activity in growth and development is depicted as the main trend in the science of child health. The author presents six lines of research on factors responsible for adaptational and regulatory mechanisms of the growing organism and depicts them as the foundation of modern pediatrics. These lines of research are: the study of general principles of regulation of autonomic and somatic functions in relation to age; study of principles of development of the higher nervous activity; study of individual characteristics of the child and assessment of his general and partial reactivity; study of the effect of environmental factors and of adaptation of the growing organism to various geographical and microsocial conditions; development of standard indicators of functions of various organs and systems in relation to different geographic zones and development of a scientific basis for physical training and conditioning of children. The fact that the present way of life creates new problems and aggravates some old problems of the development of a healthy child is emphasized. Problems related to sports activity for growing children are discussed and the need for constant medical monitoring of such activity is indicated. Problems of acceleration of development in regard to the individual and in regard to the entire generation of children today are discussed. Nearly 50 scientific institutions are working on problems of growth and development of children in various zones of the country and results of these studies must be summarized and coordinated. References 6 (Russian). [553-2791]

UDC 362.172+362.7(57)

## HEALTH PROTECTION OF MOTHER AND CHILD IN SIBERIA, FAR EAST AND FAR NORTH

Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR in Russian No 11, Nov 82  
pp 65-71

BISYARINA, V. P. and OREKHOV, K. V.

[Abstract] The population of the area under consideration consists of a high proportion of children, an average proportion of adults and a low proportion of old persons. Much of the area presents adverse environmental factors. Peculiarities of the course of pregnancy and parturition and of morbidity among women during pregnancy are discussed in relation to these factors. Results of studies of the erythron system in different periods of pregnancy in different groups of the population as a function of the time of year are presented. Data from studies of neonatal morbidity are presented. Peculiarities of antenatal organ genesis and physical development of children are

discussed. The effect of geochemical features of the regions studied on the physical development of children and on the state of their health is described. Studies of immune interrelationships between the mother and fetus in the Far North are discussed. Functional establishment and development of blood cells at different times of year are described. Peculiarities of pulmonary respiration and problems related to vision in these areas and steps to counteract them are described. References 6 (Russian).  
[553-2791]

DISCUSSIONS OF REPORTS PRESENTED AT THE 46th SESSION OF THE GENERAL CONVOCATION OF THE USSR ACADEMY OF MEDICAL SCIENCES, DEVOTED TO PROBLEMS OF HEALTH PROTECTION OF MOTHER AND CHILD. 16-19 FEBRUARY 1982, MOSCOW

Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR in Russian No 11, Nov 82  
pp 71-74

YUDENICH, O. N. (Moscow)

[Abstract] Reports of note at this meeting included those of M. G. Shandal (quantitative relationship between public health and environmental factors) which presented a model depicting the quantitative relationship between the prevalence of spontaneous abortion and the (degree of air pollution and level of residual quantities of pesticides in food); S. Ya. Doletskiy (Moscow) (morphofunctional regularities of development and growth of children); K. S. Ternovoy (Kiev) (role of general-medical measures in strengthening the health of women and children and in reducing mother and child mortality); Ye M. Luk'yanova (Kiev) (effect of extragenital pathology on pregnancy); P. N. Bargasov (Moscow) (incidence of hepatitis A and B in children); N. A. Puchkovskaya (Odessa) some basic problems of protecting vision in children); L. O. Badalyan (Moscow) (need for further development of pediatric neurology); A. P. Romodanov (Kiev) (cerebral-cranial trauma during birth). V. A. Negovskiy (Moscow) agreed with S. P. Burdenko concerning the necessity of improving reanimation measures at the prehospitalization and hospital stages of the care of neonates. L. A. Trunova (Novosibirsk) discussed problems of the mother-placenta-fetus interrelationship at different stages of normal and pathological pregnancy. V. M. Dil'man (Leningrad) analyzed some problems associated with acceleration of development, the understanding of which permits prediction of trends of age-related pathology in man. A. I. Kliorin (Leningrad) emphasized the importance of a general interdisciplinary approach to child health protection. O. Ye. Vyazov (Tbilisi) described work underway at the Institute of Human Generative Function imeni I. F. Zhordann.  
[553-2791]

RESOLUTION OF THE 46th SESSION OF THE GENERAL MEETING OF THE USSR ACADEMY OF MEDICAL SCIENCES ON CURRENT PROBLEMS OF MOTHER AND CHILD HEALTH PROTECTION

Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR in Russian No 11, Nov 82  
pp 75-76

BLOKHIN, N. N., academician, President of the USSR Academy of Medical Sciences  
and BOCHKOV, N. P., academician, Chief Scientific Secretary of the Presidium  
of the USSR Academy of Medical Sciences

[Abstract] Some achievements in the area of mother and child health protection are noted and discussed briefly and reports of the session list five areas in which deficiencies of performance by Soviet scientific institutes involved in mother and child health protection must be eliminated. The session recommended the expansion of scientific research on social-hygienic, medico-biological and clinical aspects of prevention and treatment of basic mother and child diseases. It presented a list of 10 areas of scientific research and called upon institutes of pediatrics, gynecology and obstetrics and hygiene to concentrate their efforts in these areas. It recommended the coordination of work of scientific agencies involved in problems of pediatrics and OB-Gyn with the work of other medical institutes. It asked the USSR Ministry of Health to continue organization of mother and child health protection centers in union republics and to take measures to improve the equipment of institutes involved in this work. It assigned the Presidium of the USSR Academy of Medical Sciences the task of adopting specific measures to ensure development of research on the physiology of the growing body, at scientific institutions working in this area. It asked the Presidium to work out a plan to implement the resolution of the general session within one month.  
[553-2791]



UDC 616'.5-001.4-001.29-080036.8

EVALUATION OF  $^{239}\text{Pu}$  RESORPTION RATE IN SKIN LESIONS AND EFFECTIVENESS OF THEIR TREATMENT

Moscow GIGIYENA I SANITARIYA in Russian No 6, Jun 83  
(manuscript received 2 Nov 82) pp 43-46

BAZHIN, A. G.

[Abstract] The goal of this study was to determine  $^{239}\text{Pu}$  resorption through skin lesions and the effectiveness of various treatments of these lesions. Experiments were performed on 180-200 g male Wistar rats. Three types of lesions were modelled: abrasions, scratches and cuts. The following  $^{239}\text{Pu}$  compounds were studied: citrate (monomer and polymer) pH 6.5, nitrate pH 1.0 and nitrate (polymer) pH 1.0. The  $^{239}\text{Pu}$ -nitrate contaminated lesions were then treated with dry tampons or tampons immersed in water, 2% soap solution 0.1%  $\text{KMnO}_4$ , 3% iodine solution or 5% pentacine-complexon solution. The results showed that the 2 day resorption rate of  $^{239}\text{Pu}$  through abrasions ranged from 0.046 to 17% of the material used, depending on its solubility. The daily intake of the radiolabelled material depended also on the extent of the skin lesion: for 1  $\text{cm}^2$  abrasion, skin cut and subcutaneous injection it was 0.12, 0.31 and 0.8% respectively. The best method of treating  $^{239}\text{Pu}$  contaminated lesions was a  $\text{KMnO}_4$  solution of soap, washing 5 minutes after exposure to  $^{239}\text{Pu}$  and covering the wound with sterile gauze. References: 6 (Russian) [715-7813]

UDC 613.648-07:616.2

CONTROL OF INHALATIONAL INTAKE OF LONG LASTING  $\alpha$ -EMITTERS

Moscow GIGIYENA I SANITARIYA in Russian No 6, Jun 83  
(manuscript received 2 Nov 82) pp 40-43

DEVYATYAKIN, Ye. V. and ABRAMOV, Yu. V., Institute of Biophysics, USSR Ministry of Health, Moscow

[Abstract] An attempt was made to use nose swabs sampling as a measure of determining the level of long lasting  $\alpha$ -emitters entering the human respiratory system. Ten individuals participated in the experiments, in which they inhaled

monodispersed paraffin aerosols tagged with  $^{233}\text{protactinium}$  for 10-15 min. The results obtained varied so much that this method was found to be unsuitable for operational dosimetry. At best it could only serve as a crude measure indicating potential entry of radioactive material into human breathing organs. In general, these data supported the parameters of respiratory tract models, pointing out the following: deposition of micron size aerosol particles in the tracheobronchial tree may differ several-fold from the average level; the easily-excreted fraction may be totally missing from the alveolar region, thus increasing the dose load to the lungs. To decrease the dose of retained  $\alpha$ -emitters in the rhinopharynx area, it is recommended for the individuals involved in potentially hazardous operations to gargle with pure water. References 5: 3 Russian, 2 Western.

[715-7813]

MISCELLANEOUS

UDC: 612.821.6+612.822.3+612.825.54

REVERSE TEMPORAL CONNECTIONS AND THEIR SIGNIFICANCE IN HUMAN CORTICAL REACTIONS

Moscow ZHURNAL VYSSHEY NERVNOY DEYATEL'NOSTI IMENI I. P. PAVLOVA in Russian  
Vol 33, No 2, Mar-Apr 83 (manuscript received 10 Sep 82) pp 230-240

KOSTANDOV, E. A., All-Union Scientific Research Institute of General and Forensic Psychiatry imeni V. P. Serbskiy, Moscow

[Abstract] A study is made of the physiologic significance of feedback connections representing a necessary component part of the functional structure of temporal connections formed in the ordinary sequence of combinations of signal and reinforcing stimuli. The importance of temporal connections in nervous mechanisms has long been reflected in the literature. In a series of studies on adults, averaged evoked potentials were recorded in response to visual nonverbal stimuli, sequentially combined with indifferent or emotionally significant words displayed on a screen. The entire series of studies was performed on adults 20 to 40 years of age in conflict life situations as a result of illegal actions which they had performed (prisoner population). In the formation of a temporal connection between two indifferent stimuli, it was found that the evoked cortical response to the signal stimulus was depressed when it was combined with a secondary reinforcing stimulus. A temporary connection was developed between the image of an arrow and a neutral or emotional word. An arrow inclined at 30° was combined with a neutral word, at 35°--with an emotional word. Changes in the position of the first stimulus on the screen in the associated pair were not recognized, so that the temporal relationship was formed between an unrecognized characteristic of the initial stimulus (position of arrow on screen) and a conscious, recognized word, neutral or emotional. The temporal relationships between unconscious stimuli can be recorded in long term emotional memory. They are quite persistent. The participation of the limbic system of feedback in the formation of associations between two sequences of effective stimuli can be expressed in local facilitating influences on the cortical zones, perception of signal stimuli and more diffuse depression of the neocortical activity. It can be considered that the conjugate redistribution of cortical activity in the process of development and reinforcement of a temporal connection is achieved by involvement through the limbic system of activating and inhibiting systems of the brain stem and thalamus. The important functional significance of the reversed time correlations observed is their participation in the dynamic redistribution of cortical activity occurring in the process of associative activity. Figures 4; references 25: 20 Russian, 5 Western. [478-6508]

## INTERACTION OF DIRECT AND REVERSE CONDITIONED CONNECTIONS AS NEUROPHYSIOLOGIC BASIS OF MOTIVATION OF BEHAVIOR

Moscow ZHURNAL VYSSHEY NERVNOY DEYATEL'NOSTI IMENI I. P. PAVLOVA in Russian  
Vol 33, No 2, Mar-Apr 83 (manuscript received 22 Sep 82) pp 241-247

SIMONOV, P. V., Institute of Higher Nervous Activity and Neurophysiology,  
USSR Academy of Sciences, Moscow

[Abstract] Motivation is a necessary but insufficient condition for activation of nervous mechanisms of emotion which have a specific morphologic substrate. For many years there has been a tendency to contrast the physiology of reflex theory motivations. Feedback has been considered to be the influence of the supporting reflex on the functional status of structures receiving a conditional signal and (or) implementing action, followed by reinforcement. The universality of the mechanism of bilateral conditioned communications is indicated by its presence in invertebrates. This article studies the sequence of events on the example of feeding behavior. In experiments with rats, the mechanism of the reverse conditioned communication was utilized to explain not only the expediency of externally realized actions, but also the nature of such phenomena as selective attention. When there are no objects in the environment capable of satisfying the actualized demand of the subject animal, generalization of reversed conditioned communications is observed. It has been repeatedly shown that the number of associations of undefined stimulus with food increases in man with increasing hunger and decreases after a day of food deprivation. The basis of behavior is two phenomena--the dominant and conditioned reflex, discovered and introduced to world science by the classics of domestic neurophysiology of Pavlov and others. Figures 3; references 34: 25 Russian, 9 Western.  
[478-6508]

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